Stuttgarter Beiträge zur Naturkunde
Serie A (Biologie)

Herausgeber:

Staatliches Museum für Naturkunde, Rosenstein 1, D-70191 Stuttgart

Stuttgarter Beitr. Naturk.	Ser. A	Nr. 612	42 S.	Stuttgart, 31. 8. 2000

The Isopod Genus *Tylos* (Oniscidea: Tylidae) in Chile, with Bibliographies of All Described Species of the Genus

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With 59 figures

Summary

An annotated diagnose for the genus *Tylos* is given. All described species of the genus are listed, indicating their present taxonomic situation; 20 taxa are considered valid species for which bibliographies and distribution areas are added. The two Chilean species *Tylos chilensis* Schultz, 1983 and *T. spinulosus* Dana, 1853 are redescribed, new material is recorded for both species. A neotype is designated for *T. spinulosus,* whose types are lost. The type locality "Tierra del Fuego" (54° southern latitude) of *T. spinulosus* is doubted, safe records of the two species are found between 33° and 27° southern latitude.

Zusammenfassung

Eine Diagnose für die Gattung *Tylos* wird geliefert und kommentiert. Alle beschriebenen Arten der Gattung werden aufgelistet, ihr derzeitiger taxonomischer Status wird angegeben; 20 Taxa werden als valide Arten betrachtet, für sie werden Bibliografien und Verbreitungsgebiete angefügt. Die beiden chilenischen Arten *Tylos chilensis* Schultz, 1983 und *T. spinulosus* Dana, 1853 werden nachbeschrieben, für beide Arten werden neue Funde gemeldet. Für *T. spinulosus* wird ein Neotypus aufgestellt, da das ursprüngliche Typenmaterial nicht mehr existiert. Die Typen-Lokalität „Feuerland" (54° südlicher Breite) wird angezweifelt, sichere Fundorte der beiden Arten liegen zwischen 33° und 27° südlicher Breite.

Resumen

Se da una definición comentada del género *Tylos.* Todas las especies descritas del género son listadas indicando su presente situación taxonómica; 20 taxa se consideran como especies válidas para las cuales se añaden bibliografías y áreas de distribución. Las dos especies chilenas *Tylos chilensis* Schultz, 1983 y *T. spinulosus* Dana, 1853 son redescritas, se comunican nuevos hallazgos de ambas especies. Se designa un neotipo para *T. spinulosus* dado que ya no existen los tipos originales. Además, la localidad típica "Tierra del Fuego" (54° latitud sur) es dudosa, seguros lugares de hallazgo se sitúan entre los 33° y 27° latitud sur.

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1. Introduction

A number of new samples of *Tylos* from Chile contained the two species recorded by SCHULTZ (1983) as *T. spinulosus* Dana, 1853 and *T. chilensis* n.sp. The doubtful taxonomic status of *T. spinulosus* (see chapter 3.) initiated us to designate a **neotype** for *T. spinulosus* sensu SCHULTZ, 1983; this was the only possibility to avoid any of the species names to be left as nomen dubium. Moreover a detailed morphological documentation of this species is presented as a basis for further studies on the genus, and some records and figures are added for *T. chilensis.* The diagnose of the genus *Tylos* is critically revised and improved, and in a check-list of all described species of the genus bibliographies are given for the 20 species presently considered as valid.

2. The genus *Tylos* Audouin, 1826

Type-species: *Tylos Latreillii* Audouin, 1826; this species is presently a nomen dubium, it can be either *T. europaeus* or *T. ponticus* (TAITI & FERRARA 1996: 460). The designation of a neotype of T. latreillii from the type locality "Egypt" would clear up the taxonomic situation.

The genus *Tylos* in its present definition has a worldwide distribution. All 20 species presently considered as valid live in the marine litoral zone on sandy substrate where they feed mainly on algae and other wrack thrown ashore by wave action (HAMNER et alii 1969, KENSLEY 1974). Feeding takes place in the night, to avoid heavy predation by diurnal predators (birds, brachyurans). Body length varies from around 10 to 55 mm in *Tylos granulatus* Krauss, 1843 from South Africa, which is the largest species of all Oniscidea.

The closest relative of *Tylos* is the monotypic genus *Helleria* from the northwestern Mediterranean. The two genera form the certainly monophyletic family Tylidae, which according to the present state of knowledge is the sister-group of all other terrestrial isopods except the Ligiidae (ERHARD 1997). It is not clear whether *Tylos* is a monophyletic taxon, no unequivocal synapomorphies for *Tylos* have been found up to now.

Diagnosis of the genus *Tylos:*

1. Able to roll up into a perfect ball, with pereion-epimera vertical and pleonites no longer mobile towards each other.
2. Pereion-epimera II–VII separated from tergites by conspicuous sutures.
3. Pleon-tergites not fused (contrary to *Helleria*).
4. With phylacomera (ventral processes of pleon-epimera) at least in pleonite V (very short, but present in *T. capensis* Krauss, 1843).

5. Telson quadrangular.
6. Antenna I (antennula) reduced to one joint.
7. Antenna II with three- or four-jointed flagellum, apical joint much smaller than preceding ones.
8. Mandible with pars molaris.
9. Endite of maxilla I with one apical and two medio-apical penicils (also in *T. chilensis* Schultz, 1983 contrary to fig. 4 G in SCHULTZ 1983: 679, where it is erroneously named "Maxilla 2").
10. Pereiopod VI and VII with setal ribbons and grooves as part of the water-conducting system.
11. Genital apophysis absent in male.
12. Pleopod-exopodites ventrally with lungs. Males of both *T. spinulosus* and *T. chilensis* possess also an exopodite I, so the groundplan contains 5 exopodites (see ERHARD 1996: 32, footnote).
13. Pleopod-endopodite I and in females also exopodite I always lacking.
14. Uropods in a completely ventral position, with apical endopodites, exopodites completely reduced.
15. Cuticular surface covered with short upright and blunt setae which can be partly or completely cleft.

This diagnose includes only characters of the exterior morphology. For more common derived characters (synapomorphies) of the family Tylidae and a phylogenetic interpretation see ERHARD (1997).

Characters 2, 8, 9 and 10 are plesiomorphic inside the Oniscidea, character 3 is plesiomorphic inside the Tylidae. All other enumerated characters are synapomorphies of the family Tylidae, including the genera *Tylos* and *Helleria.*

One derived character observed in many species of *Tylos* is a latero-apical process on the basipodite of pereiopod I in both male and female. It is not included in the diagnose, since it is missing in the two south African species *T. granulatus* and *T. capensis* and perhaps in other species. SCHULTZ (1974: 172, figs. 119–121), illustrating *T. marcuzzii* Giordani Soika, 1954 obviously mixed up pereiopod I with pereiopod VII.

3. Species list with bibliographies and distribution areas
(valid species *numbered* and in **bold type**)

Tylos africanus Ferrara, 1974 = ***T. minor***

1. ***Tylos albidus*** Budde-Lund, 1885

Tylos albidus: BUDDE-LUND 1879: 9 (nomen nudum); – BUDDE-LUND 1885: 276; – BUDDE-LUND 1906: 77, plate III, figs. 37–40; – TAITI & FERRARA in prep.

Recorded distribution: Nicobar Islands; Maldive Islands; Sri Lanka (± 7° northern latitude).

Tylos algerinus Verhoeff, 1949 = ***T. ponticus***

Tylos armadillo Latreille, 1829 = ***T. ponticus*** or ***T. europaeus***

Tylos armadillo: Latreille 1829: 142; faunistic data not cited, see under *T. latreillei.*

2. ***Tylos australis*** Lewis and Bishop, 1990

Tylos australis: Lewis & Bishop 1990: 747, 27 figs.; – Lewis 1990: 94, 4 figs.; – Lewis 1991: 110, 4 figs.

Recorded distribution: Australia, New South Wales (±120 km south of Sydney, 35° southern latitude).

Tylos bilobus Lewis, 1990 = ***T. opercularis***

3. ***Tylos capensis*** Krauss, 1843

Tylos capensis: Krauss 1843: 64, plate IV, fig. 6; – Budde-Lund 1885: 276; – Budde-Lund 1906: 73, plate III, figs. 14–18; – Stebbing 1910 b: 439; – Barnard 1932: 218, figs. 11 c–e; – Vandel 1952: 192; – Kensley 1974: 410, 413, 416, figs. 4 b, 7 b, 8 a–e, 9, 16, 30, table 17; – Kensley 1978: 162, fig. 71 G; – Ferrara & Taiti 1979: 91; – Hoese 1983: 497, fig. 4 b; – Holdich 1984: 31, figs. 51–52; – McLachlan & Sieben 1991: 43, figs. 1–4; – Brown & Odendaal 1994: 95.
Tylos Capensis: Herklots 1851: 27; – Budde-Lund 1879: 9.
Tylos incurvus: Budde-Lund 1906: 79, plate III, fig. 41.
Tylos granulatus (nec Krauss, 1843): Collinge 1945: 345.

Recorded distribution: South African east coast from False Bay to Port Elizabeth (34° to 35° southern latitude, Kensley 1974: 412). The distributional record "Namibia" in Ferrara & Taiti 1979: 90 is a misinterpretation of the records given in Kensley 1974.

4. ***Tylos chilensis*** Schultz, 1983

Tylos spinulosus non Dana, 1853: Schultz 1970: 302, figs. 18–27.
Tylos chilensis: Schultz 1983: 680 ff., figs. 4 A–I, 5 A–H; – Leistikow & Wägele 1999: 4; see chapter 4.2.

Recorded distribution: Chile, between Valparaiso and Caldera NW Copiapó (33° to 27° southern latitude).

Tylos cilicius Verhoeff, 1941 = ***T. europaeus***

5. ***Tylos europaeus*** Arcangeli, 1938

Tylos Latreillei: Budde-Lund 1906: 74, plate III, figs. 1–13.

Tylos latreillei europaeus: ARCANGELI 1938: 145, plate VI, figs. 11–12; – VANDEL 1956: 250; – VANDEL 1960: 108, figs. 48 A–C; – KARAMAN 1966: 373; – ZANGHERI 1966: 517; – MEAD 1968: 347; – VANDEL 1968: 5; – CARUSO 1973: 71, fig. 2; – FERRARA & TAITI 1978: 6; – TAITI & FERRARA 1980: 250; POTOĆNIK 1984: 79, 80.
Tylos cilicius: VERHOEFF 1941: 255, figs. 40–41; – VERHOEFF 1949: 340, plate XX, figs. 9–11.
Tylos Latreillii: ROSSI 1948: 201, figs. 9–15.
Tylos sabuleti: VERHOEFF 1949: 339, plates XIX–XX, figs. 4–8.
Tylos Latreillii europaeus: ARCANGELI 1952 b: 158.
Tylos latreillei: PAULI 1954: 115, figs. 5/1–7; – GIORDANI SOIKA 1962: 145.
Tylos europaeus: GIORDANI SOIKA 1954: 67, 75, 81, figs. 3–5, 8/3, 10/2; – STROUHAL & PRETZMANN 1975: 624; – KUSAKIN 1982: 449, 451, figs. 334 A–D; – ARGANO & MANICASTRI 1991: 4; – ARGANO & MANICASTRI 1995: 286; – UGOLINI et alii 1995: 387; – COLOMBINI et alii 1996: 247; – FALLACI et alii 1996: 751; – TAITI & FERRARA 1996: 460, figs. 1 A–D.

Recorded distribution: Coasts of the Black Sea and the Mediterranean Sea; Atlantic coasts of Europe as far north as the Bretagne (France); Azores (35° to 48° northern latitude). Records of *T. latreillii* from the Atlantic coasts of America and from the Bermuda Islands may refer to this species (compare VAN NAME 1936: 409 f., fig. 250; KENSLEY & SCHOTTE 1989: 250, fig. 106 H), or to *T. ponticus* as suggested by fig. 13 in SCHULTZ 1970: 299; confirmation is however needed.

Most records of *Tylos latreillii* refer either to *T. ponticus* or to *T. europaeus.* Records not allowing an unambiguous assignment to one of these two species are not included in this bibliography.

6. ***Tylos exiguus*** Stebbing, 1910

Tylos exiguus: STEBBING 1910 a: 228, plate 23, 19 figs.; – STEBBING 1910 b: 439; – ARCANGELI 1952 a: 139; – GIORDANI SOIKA 1954: 81, 83; – FERRARA & TAITI 1979: 92; – SCHULTZ 1983: 682.
Tylos Latreillii erythraeus: ARCANGELI 1938: 144, plate III, figs. 3–6.

Recorded distribution: Red Sea, coasts of Sudan and Eritrea (13° to 20° northern latitude).

7. ***Tylos granulatus*** Krauss, 1843

Tylos granulatus: KRAUSS 1843: 64, plate 4, fig. 5; – HERKLOTS 1851: 27; – BUDDE-LUND 1885: 275; – BUDDE-LUND 1906: 75, plate III, figs. 21–24; – BUDDE-LUND 1909: 70; – STEBBING 1910 b: 439; – BARNARD 1924: 236; – PANNING 1924: 172; – HAUGHTON 1931: 27; – BARNARD 1932: 217, figs. 11 a–b; – BARNARD 1940: 438; – VANDEL 1943: 40; – GRUNER 1954: 316, fig. 10; – BROWN 1959: 470; – PENRITH & KENSLEY 1970: 209; – KENSLEY 1972: 1, fig. 1; – KENSLEY 1974: 403, figs. 1, 2 a–c, 3 a–f, 4 a, 5 a–b, 6, 7 a; – KENSLEY 1978: 162, figs. 71 F, H; – FERRARA & TAITI 1979: 92; – EBBE 1981: 551, figs. 1–19; – HOESE 1983: 491, figs. 3 a–f, 4 a; – BROWN & ODENDAAL 1994: 91, figs. 2, 4–7, 9–11, 14, 17; – VILLIERS & BROWN 1994: 186; – BROWN & TRUEMAN 1996: 425, figs. 1–2.
Non *Tylos granulatus:* MIERS 1877; THIELEMAN 1910; ONDO 1952; ONDO 1953; ONDO 1954; IGA 1972; KUSAKIN 1974; IMAFUKU 1976; KUSAKIN 1976 (= *Tylos granuliferus*).
Non *Tylos granulatus:* COLLINGE 1945 (= *Tylos capensis*).

Recorded distribution: From Ventura wreck site in northern Namibia along the South African west coast down to Cape Town, southernmost record 24 km N Cape Point (19° to 34° southern latitude, KENSLEY 1974: 412). KENSLEY (1978: 162)

states "Northern South West Africa to Port Elizabeth", but the latter seems to be a "printing error", since some authors explicitly emphasize that *T. granulatus* and *T. capensis* do not occur sympatricly.

8. ***Tylos granuliferus*** Budde-Lund, 1885

Tylos granulatus (nomen praeocc.): Miers 1877: 674; – Thielemann 1910: 76; – Ondo 1952: 55; – Ondo 1953: 20; – Ondo 1954: 1; – Iga 1972: 408; – Kusakin 1974: 285, fig. 22; – Imafuku 1976: 299; – Kusakin 1976: 75, fig. 175.
Tylos granuliferus: Budde-Lund 1885: 279; – Budde-Lund 1906: 78; – Kusakin 1982: 452, figs. 335–336; – Kwon 1993: 134, figs. 1 A–C, 2 A–I, 3 A–F; – Kwon 1995: 510.
Tylos granuriferus [sic]: Nunomura 1990: 39, figs. 156 A–J, 157; – Nunomura 1991: 43.

Recorded distribution: Russia, Vladivostok and southernmost Kuril Islands; Korea; Japan (33° to 45° northern latitude); ? Borneo.

Tylos incurvus Budde-Lund, 1906 = ***T. capensis***

Tylos inscriptus (L. Koch, 1856) = *T. latreillii* (nomen dubium)

Tylos insularis Van Name, 1936 = ***T. punctatus insularis***

Tylos latreillii Audouin, 1826 = ***T. europaeus*** or ***T. ponticus***

Tylos Latreillii: Audouin 1826: 96, plate 13, fig. 1 (= 17 figs.).

Remarks: The two Mediterranean species *Tylos europaeus* and *T. ponticus* recognized today have not been distinguished before 1938 and in many cases not until recently but were indiscriminately referred to *T. latreillii.* This name has to be considered a nomen dubium since the original description does not allow a doubtless ascription to one of the two Mediterranean species and the type material is lost (discussion and figures of diagnostic characters of these two species see Taiti & Ferrara 1996). So all records of *T. latreillii* whose identity is not clear are omitted in the present bibliography. Records of *T. latreillii* from North America may refer to one of the Mediterranean species or to a distinct American species.

Tylos latreillii europaeus Arcangeli, 1938 = ***T. europaeus***

Tylos latreillii niveus Budde-Lund, 1885 = ***T. niveus***

Tylos latreillii pelagicus Arcangeli, 1955 = ***T. europaeus*** or ***T. ponticus***

9. ***Tylos maindroni*** Giordani Soika, 1954

Tylos Maindroni: Giordani Soika 1954: 76, figs. 8/1, 8/2, 9/1, 9/2, plate 10, figs. 4–5.
Tylos maindroni: Ferrara & Taiti 1986: 94; – Taiti & Ferrara 1991: 213, figs. 3 a–m.

Recorded distribution: Persian Gulf, Kuwait, Oman and Iran (Busher) (23° to 30° northern latitude).

10. ***Tylos marcuzzii*** Giordani Soika, 1954

Tylos Latreillei non Audouin: Vandel 1952: 72.
Tylos Marcuzzii: Giordani Soika 1954: 79, fig. 10/1.
Tylos marcuzzii: Schultz 1974: 163, figs. 112–121; – Schultz 1984: 4; – Schultz & Johnson 1984: 155: figs. 1 E–F; – Kensley & Schotte 1989: 250, fig. 106 I; – Garcés 1991: 220; – Leistikow & Wägele 1999: 4.

Recorded distribution: Florida; Bahamas; Leeward Islands; Belize; Venezuela (11° to 26° northern latitude).

11. ***Tylos minor*** Dollfus, 1893

Tylos minor: Dollfus 1893: 189, figs. 4 a–e; – Budde-Lund 1906: 76, plate III, figs. 25–26; – Ferrara & Taiti 1979: 92; – Taiti & Ferrara 1984: 143; – Ferrara & Taiti 1985: 292; – Kwon & Taiti 1993: 3, figs. 1–12; – Ferrara & Taiti 1998: 286; – Taiti & Ferrara in prep.
Tylos capensis non Krauss: Roman 1970: 168.
Tylos africanus: Ferrara 1974: 194, figs. 3–18; – Chelazzi & Ferrara 1978: 211, 212; – Ferrara & Taiti 1979: 91 (compare Ferrara & Taiti 1998: 286; – Taiti & Ferrara in prep.).
Tylos ochri: Roman 1977: 111, figs. 1–5 (55 figs.); – Ferrara & Taiti 1979: 93 (compare Taiti & Ferrara in prep.).

Recorded distribution: Somalia, Sar Uanle south of Kismayu (0°30′ southern latitude); Kenya, Shimoni and Watamu Beach; Seychelles Islands; Aldabra Island; Comoro Islands (4° to 12° southern latitude); Madagascar: Toliara (23° southern latitude); Hong Kong (23° northern latitude).

12. ***Tylos neozelanicus*** Chilton, 1901

Tylos neozelanicus: Chilton 1901: 120, plate 13, fig. 2 (12 figs.); – Budde-Lund 1906: 78; – Chilton 1910: 288; – Hurley 1950: 120, plate I, fig. 9; – Hurley 1961: 272; – Vandel 1977: 3; – Schultz 1983: 682; – Lewis & Bishop 1990: 748, fig. 1.

Recorded distribution: New Zealand, Wellington (42° southern latitude).

13. ***Tylos niveus*** Budde-Lund, 1885

Tylos niveus: Budde-Lund 1885: 278; – Dollfus 1890: 8, plate I, fig. 5; – Richardson 1905: 585; – Budde-Lund 1906: 76, plate III, figs. 31–33; – Boone 1934: 597, figs. 11 A–B, 14 A–B; – Van Name 1936: 414, fig. 256; – Vandel 1949: 4; – Vandel 1952: 72, figs. 3 A–D; – Mulaik 1960: 93, plate I, figs. 5–9; – Scultz 1970: 302, figs. 1–6: – Lemos de Castro 1971: 9; – Schultz 1974: 165; – Vandel 1981: 38; – Schultz 1984: 3; – Schultz & Johnson 1984: 155, figs. 1 C–D; – Schultz 1986: 372; – Armas &

DAVILA 1988: 2; – KENSLEY & SCHOTTE 1989: 250, fig. 106 J–K; – MUCHMORE 1993: 31; – LEISTIKOW & WÄGELE 1999: 4.
Tylos latreillii niveus: ARCANGELI 1938: 139; – LEMOS DE CASTRO 1952: 2, figs. 1–16.

Recorded distribution: Florida; Bahamas; Caribbean islands Cuba, Dominica, Tobago, Bonaire, Curaçao, Virgin Islands; Mexico; Belize; Venezuela (10° to 25° northern latitude); Brazil (near Rio de Janeiro, 23° southern latitude, perhaps introduced).

14. *Tylos nudulus* Budde-Lund, 1906

Tylos nudulus: BUDDE-LUND 1906: 76, plate III, figs. 27–30.

Recorded distribution: Christmas Island south of Java (politicly belonging to Australia, 11° southern latitude).

15. *Tylos opercularis* Budde-Lund, 1885

Tylos opercularis: BUDDE-LUND 1885: 277; – BUDDE-LUND 1906: 77, plate III, figs. 34–36; GRAVE & SIMON 1992: 222; – TAITI et alii 1992: 790, figs. 2 a–f, 3 a–f.
Tylos bilobus: LEWIS 1990: 93, 24 figs.; – LEWIS 1991: 110, 4 figs.

Recorded distribution: Philippines; northern Papua New Guinea; Indonesia, Sulawesi, Sumbawa; Australia, Queensland (10° northern latitude to 22° southern latitude).

16. *Tylos ponticus* Grebnitzky, 1874

Tylos Latreilli var. *pontica:* GREBNICKY 1874: 250, plate III.
Tylos Ponticus: BUDDE-LUND 1885: 274.
Tylos ponticus: BUDDE-LUND 1906: 75, plate III, figs. 19–20; – PAULI 1954: 115, figs. 5/8–9; – GIORDANI SOIKA 1962: 146; – KUSAKIN 1982: 449, figs. 333 (7 figs.); – LANZA & POGGESI 1986: 121, 180; – TAITI & FERRARA 1996: 462, figs. 2 A–D.
Tylos Latreillii ponticus: ARCANGELI 1938: 145.
Tylos Latreillii sardous ARCANGELI 1938: 145, plate V, figs. 9–10; – ARCANGELI 1950: 144.
Tylos algerinus: VERHOEFF 1949: 339, plates XIX–XX, figs. 1–3, 12–13.
Tylos sardous: GIORDANI SOIKA 1954: 73; – GIORDANI SOIKA 1956: 14, plate III, 3 figs.
Tylos latreillii: DEMIR 1954: 360, figs. 148 A–C.
Tylos latreillei: SCHMALFUSS 1974: 1, figs. 1, 14–17, 21–22, 26, 30, 35, 43–45, 51–52, 56, 62–63; – STROUHAL & PRETZMANN 1975: 623; – HOESE 1982: 416, figs. 8 a–d; – HOESE 1983: 479, figs. 5 a–b; – RADU 1983: 62, figs. 31 A–G; – ERHARD 1995: 6 ff., figs. 9–10, 15, 20–21, 24–25, 36–38, 48–49, 52, 66–69, 102–104; – ERHARD 1996: 3, fig. 15; – ERHARD 1997: 3 ff., fig. 26.
Tylos latreillei sardous: MATSAKIS 1957: 107; – VANDEL 1960: 109, figs. 48 D–E; – MEAD 1968: 356; – VANDEL 1968: 5; – CHAMBOREDON et alii 1970: 185; – LAGARRIGUE 1971: 484; – CARUSO 1973: 70, fig. 1; – CARUSO 1974: 137; – FERRARA & TAITI 1978: 6; – TAITI & FERRARA 1980: 249; – CARUSO & LOMBARDO 1982: 7; – CARUSO & LOMBARDO 1995: 100.

Recorded distribution: Coasts of the Mediterranean and the Black Sea, and Atlantic coast of northwestern Africa south to Dakar; Madeira; Canary Islands (15° to 45° northern latitude); perhaps also Red Sea (compare TAITI & FERRARA 1991: 213). Records of *T. latreillii* from the Bermuda Islands may partly refer to this species (compare SCHULTZ 1970: 299, fig. 13).

17. ***Tylos punctatus*** Holmes and Gay, 1909

Tylos punctatus: Holmes & Gay 1909: 376, figs. 3–4; – Stafford 1913: 182, fig. 6; – Johnson & Snook 1927: 292, fig. 249; – Van Name 1936: 410, figs. 251–253; – Van Name 1940: 140; – Vandel 1949: 5, fig. 4; – Hamner et alii 1968: 405; – Hamner et alii 1969: 442; – Hayes 1970 a: 514; – Hayes 1970 b: 721; – Hayes 1974: 838; – Hayes 1977: 165; – Holanov & Hendrickson 1980: 81; – Garthwaite et alii 1985: 25; – Leistikow & Wägele 1999: 4.
Tylos punctatus punctatus: Schultz 1970: 300, figs. 7–11; – Schultz 1974: 166.
Tylos latreillei pro parte, non Audouin: Van Name 1924: 189, figs. 6–10.
Tylos insularis: Van Name 1936: 412, figs. 254–255; – Vandel 1949: 4;– Leistikow & Wägele 1999: 4.
Tylos punctatus insularis: Schultz 1970: 300.

Systematics: Schultz (1970: 300) compared the type specimens of *T. insularis* with material of *T. punctatus* and concluded that *T. insularis* should be considered as a subspecies of *T. punctatus.* In a check-list of American Oniscidea Leistikow & Wägele (1999: 4) list *T. insularis* as a separate species without considering the arguments of Schultz 1970. In the present paper I follow the conclusion of Schultz and keep *T. insularis* as a subspecies of *T. punctatus.*

Recorded distribution: *T. p. punctatus:* California from Los Angeles (USA) to Guaymas (Sonora, Mexico) (28° to 34° northern latitude); *T. p. insularis:* Galapagos Islands (±0° latitude).

Tylos sabuleti Verhoeff, 1949 = ***T. europaeus***

Tylos sardous Arcangeli, 1938 = ***T. ponticus***

18. ***Tylos spinulosus*** Dana, 1853

Tylos spinulosus: Dana 1853: 717, plate 47, figs. 1 a–c; – Miers 1877: 675; – Chilton 1901: 121; – Budde-Lund 1906: 78; – Chilton 1910: 288; – Van Name 1924: 192; – Van Name 1936: 415, fig. 257; – Arcangeli 1938: 149; – Van Name 1940: 140, fig. 32; – Hoese 1983: 492, figs. 2 a–d; – Schultz 1983: 675, figs. 1 A–J, 2 A–F, 3 A–E; – Erhard 1996: 32; – Erhard 1997: 49, fig. 77; – Leistikow & Wägele 1999: 4; see chapter 4.1.
Non *Tylos spinulosus:* Schultz 1970: 302, figs. 18–27.

Recorded distribution: Chile between Copiapó and Coquimbo (27° to 30° southern latitude). The type locality "Nassau Bay, Fuegia" is doubtful (see chapter 4.1.).

19. ***Tylos tantabiddyi*** Lewis, 1991

Tylos tantabiddyi: Lewis 1991: 109 ff., figs. 1–7 (25 figs.).

Recorded distribution: Western Australia, Exmouth Peninsula, west coast (22° southern latitude).

20. ***Tylos wegeneri*** Vandel, 1952

Tylos wegeneri: Vandel 1952: 74 ff., figs. 4–10; – Schultz 1983: 675, 682; – Kensley & Schotte 1989: 250, fig. 106 L; – Garcés 1991: 220; – Leistikow & Wägele 1999: 4.
Tylos wagneri [sic]: Schultz 1970: 304, figs. 28–30.
Tylos wageneri [sic]: Schultz 1974: 165 f.

Recorded distribution: Venezuela; Lesser Antilles, St. Martin; Trinidad; Tobago; Costa Rica, Pacific coast, Puntarenas (all records ± 10° northern latitude).

4. *Tylos* in Chile

Dana (1853: 717) described *T. spinulosus* from Nassau Bay in Tierra del Fuego. Schultz (1970) reported this species from near Valparaiso. In a later publication (Schultz 1983) this author identified another species from north of Coquimbo as *T. spinulosus* and described the specimens from Valparaiso as the new species *T. chilensis.*

After Dana's description the species cannot be safely identified, the type specimens have been lost in a shipwreck (Bowman, in litt.) and the type locality seems to be a labelling error because nowhere in the world has the genus been found at such high latitudes (± 54° south). The safe records of the genus in Chile are from 2500 km further north.

After investigation of new material of the two Chilean species we conclude that *T. chilensis* could be just as well identical with *T. spinulosus* Dana as with *T. spinulosus* sensu Schultz, 1983. However, to avoid further confusion and to consolidate the taxonomical situtation we designate a neotype for *T. spinulosus* sensu Schultz, 1983, and give a detailed morphological documentation of this species. Also for *T. chilensis* some additional morphological information is presented.

The two species safely known from Chile are recorded between Valparaiso and Copiapó (33° to 27° southern latitude). The smaller species *T. chilensis* has been found between Valparaiso and N of Copiapó (Caldera), the remarkably big species *T. spinulosus* is known between Coquimbo and Copiapó. According to Schultz (1983) the two species are ecologically separated, *T. spinulosus* burrows on sandy beaches, while *T. chilensis* lives "under rocks and in crevices high on a cliff facing the sea in the spray zone".

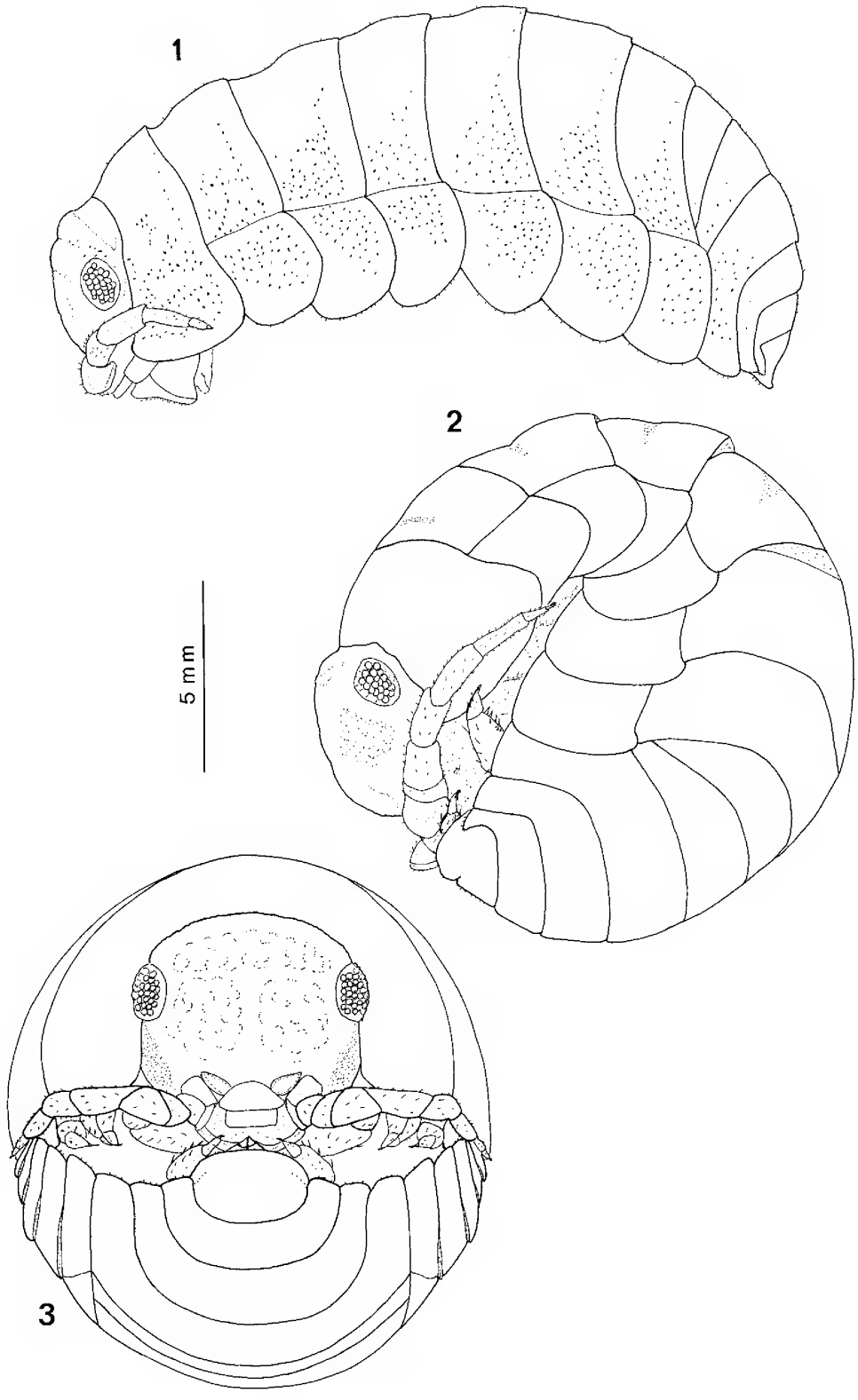
4.1. *Tylos spinulosus* Dana, 1853
(Figs. 1–37 and map fig. 59)

Bibliography see list on p. 9.

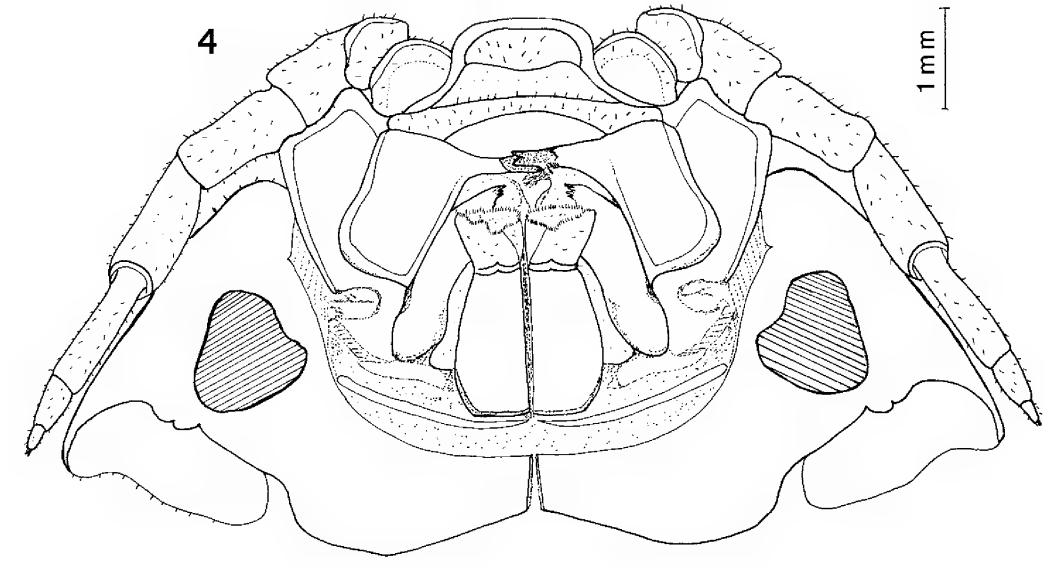
Material examined

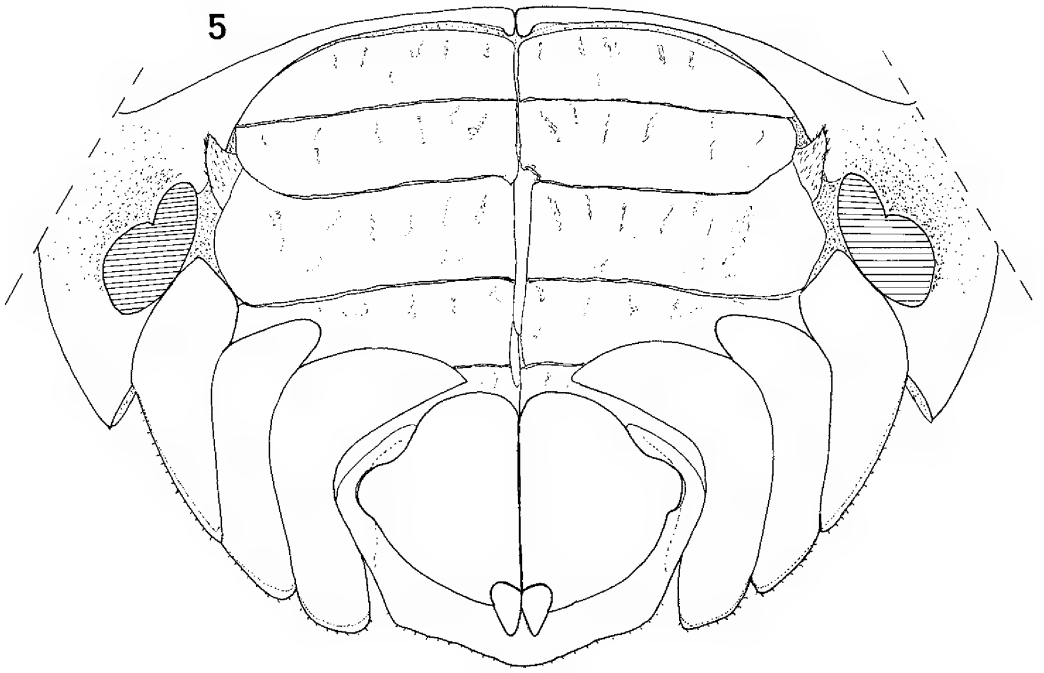
Neotypus, herewith designated. ♂, 25 mm long, Chile, Region de Atacama, N Huasco, Quebrada Carrizalillo, leg. Peña 11.–13. X. 1980 (SMNS T425).

Chile, Region de Atacama: Same data as neotype, 14 ad. specimens (SMNS 10023), 3 ad. specimens (SMNS 10030), 24 ad. and juv. specimens (SMNS 10024), 13 ad. specimens (SMNS 10026), 18 ad. and juv. specimens (SMNS 10027), 300 juv. specimens (SMNS 10028), 385 juv. specimens (SMNS 10029); – Copiapó, Puerto Viejo, leg. Peña 10. X. 1980, 15 juv. specimens (SMNS 10025).



Figs. 1–3. *Tylos spinulosus*, ♂, neotype, 25 mm long (SMNS T425, N Huasco), whole animal in different positions.





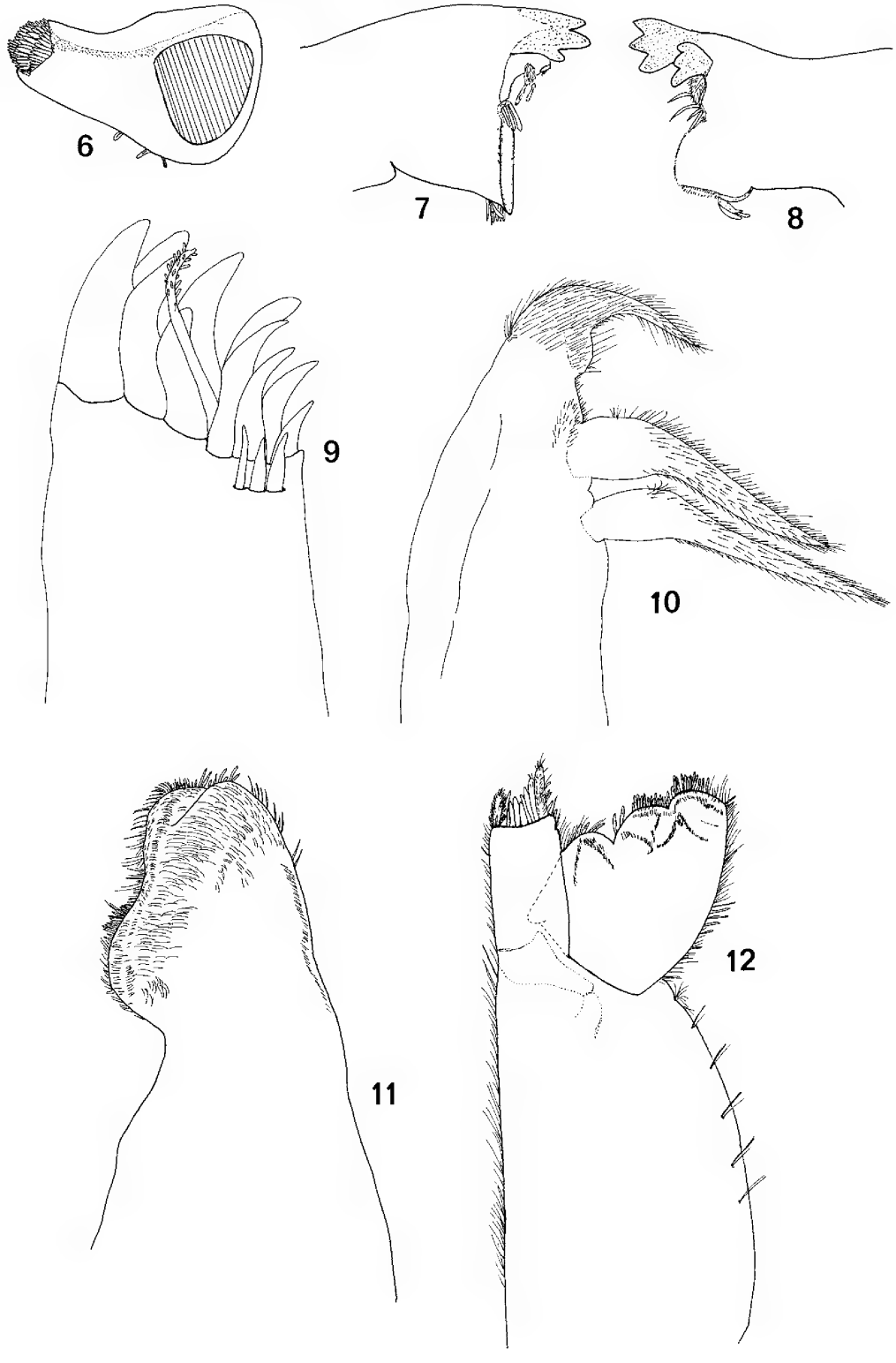
Figs. 4–5. *Tylos spinulosus*, ♂, neotype. – 4. Head and pereionite I in ventral view; – 5. pleon in ventral view.

Description

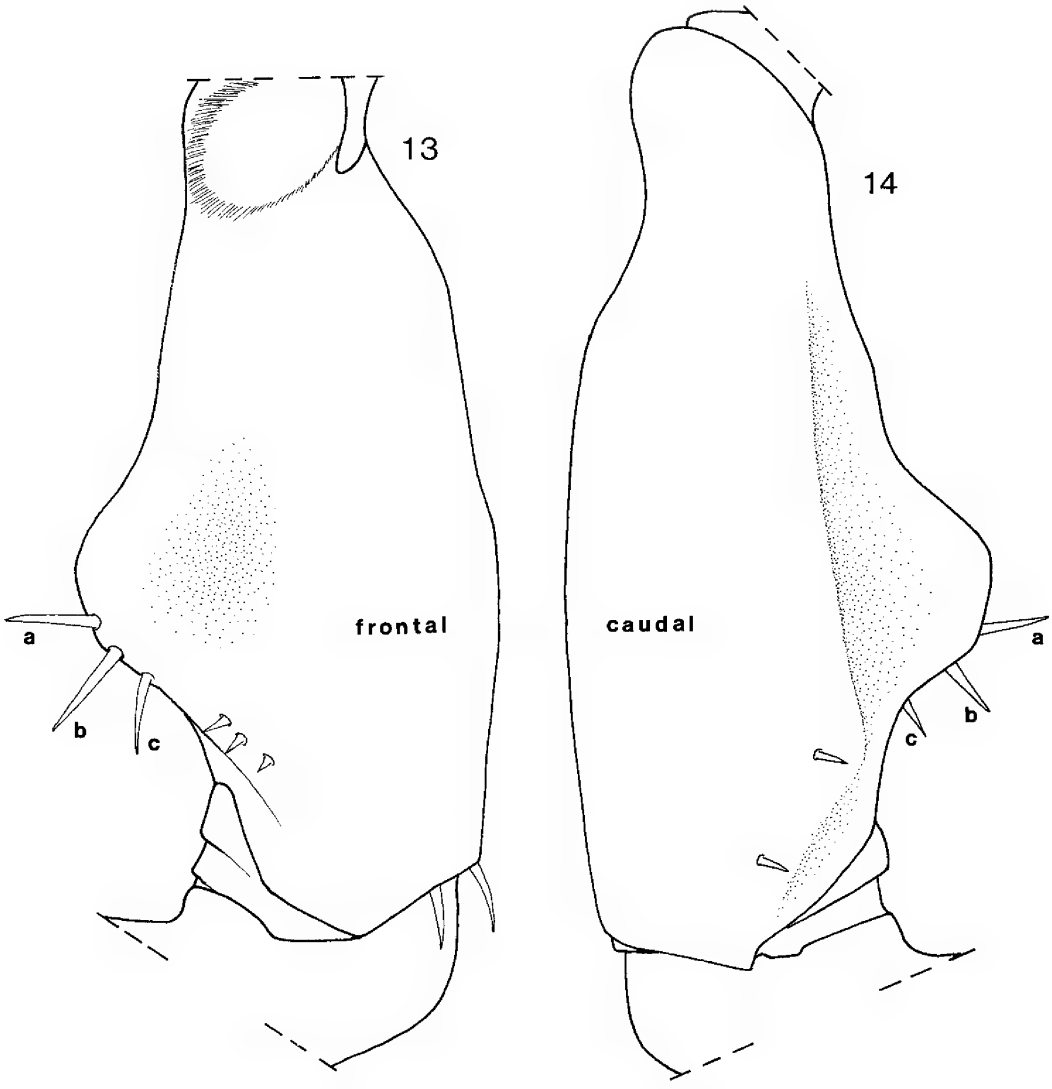
Coloration: Yellowish, dorsally with many very small dark pigmented dots of various densities.

Maximum dimensions: Length 25 mm, width 13 mm.

Cuticle covered with short upright and blunt setae which may be partly or completely cleft. Lateral view of whole animal see fig. 1, rolled-up animal see figs. 2–3.

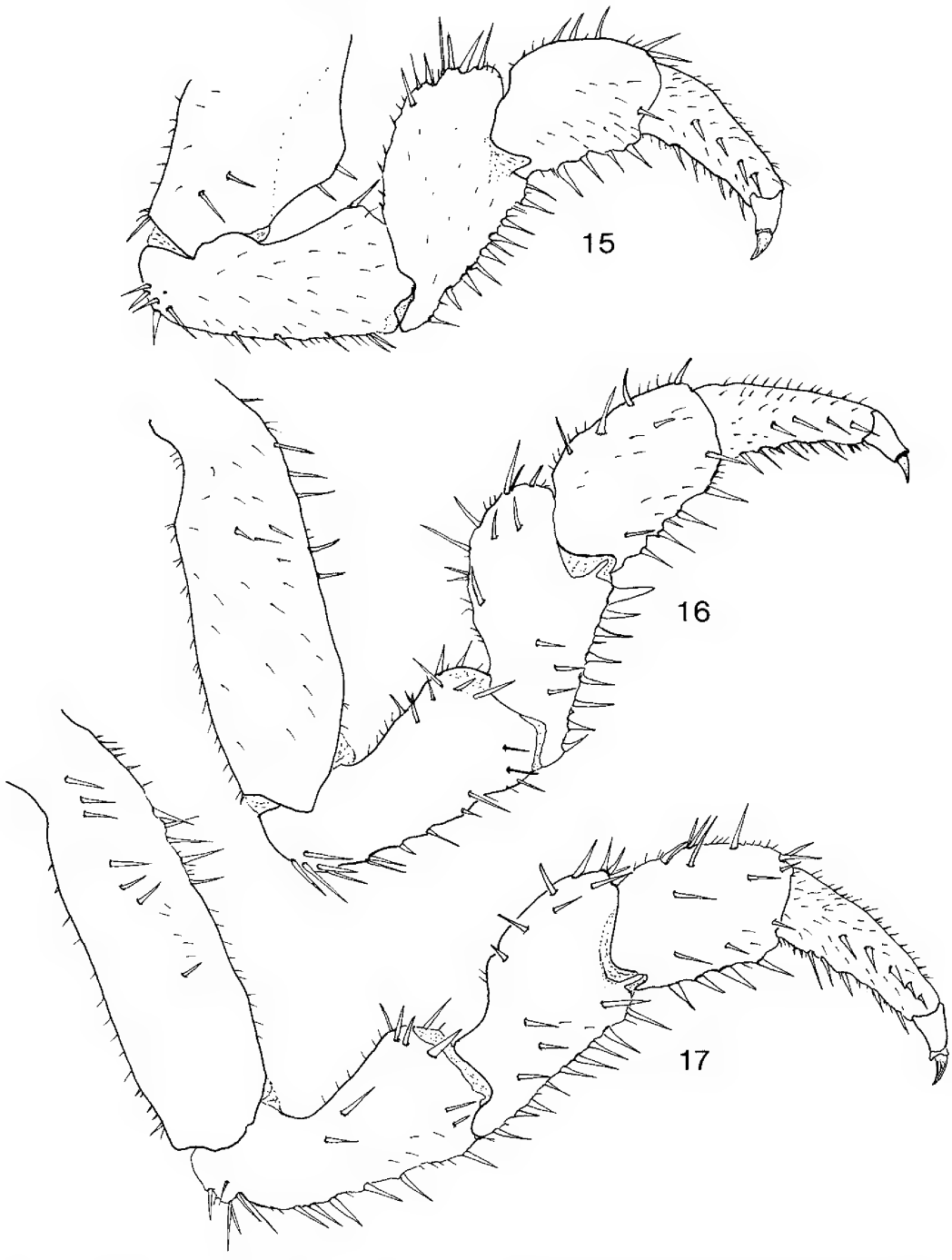


Figs. 6–12. *Tylos spinulosus,* ♂, neotype. – 6. Antenna I (antennula); – 7. right mandible; – 8. left mandible; – 9. exite of maxilla I; – 10. endite of maxilla I; – 11. maxilla II; – 12. maxillipede.



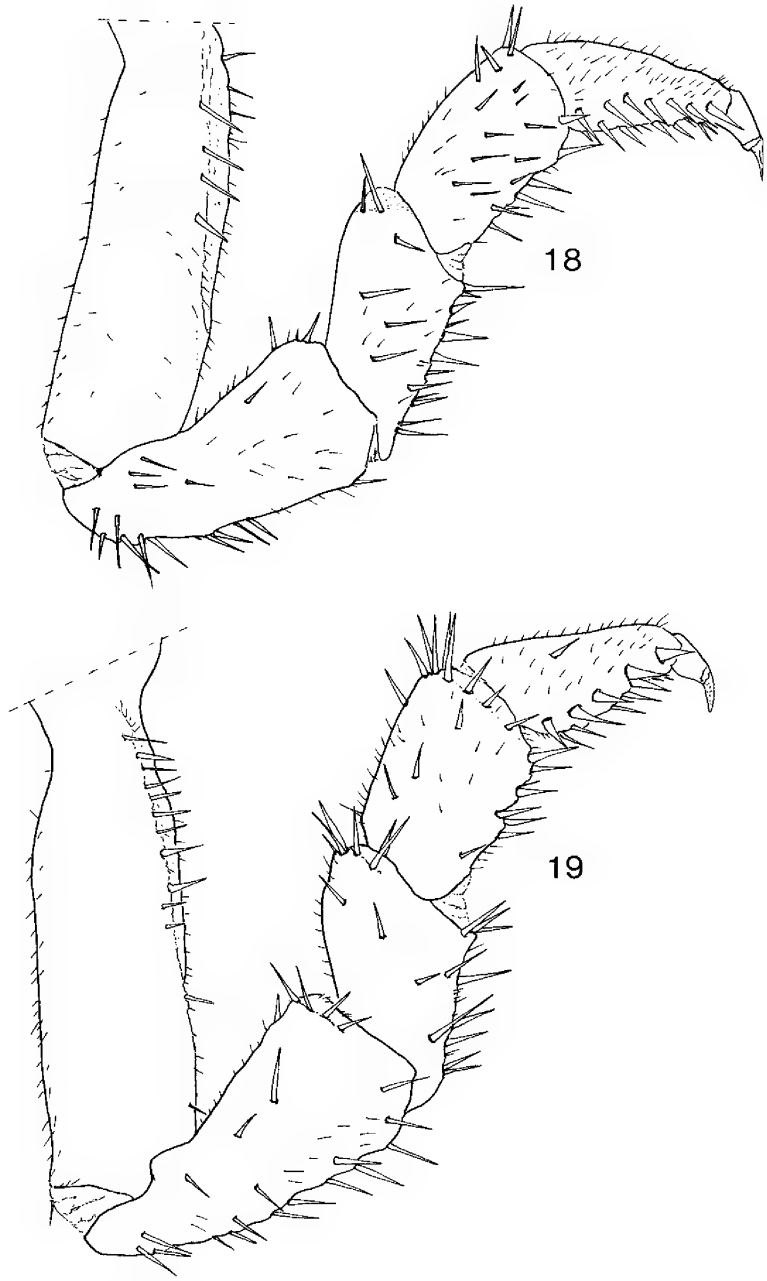
Figs. 13–14. *Tylos spinulosus*, ♂, 24 mm long (SMNS 10023, same sample as neotype). Basipodite of pereiopod I, frontal and caudal view; spines *a*, *b* and *c* are partly or completely missing in other syntopic specimens of the same size.

Head with triangular protrusion between antennae as in most species of the genus, laterally of the antennae with narrow sockets (figs. 3–4). Eyes with ± 28 ommatidia. Pereion-epimera I without schisma or lateral groove. Pleon and telson see fig. 5. The ventral phylacomera are present on pleon-epimera IV and V, the latter are bent medially, sickle-shaped and acutely pointed (fig. 5). Antenna I (antennula) is longish club-shaped (fig. 6). Antenna II has a three-jointed flagellum, the proximal joint is more than twice as long as the second one, while the apical one is much smaller than the second one (fig. 4). Mandibles see figs. 7 (right) and 8 (left). Exite of maxilla I with 5 strong lateral teeth and five smaller interior ones which are not cleft or serrated (fig. 9), between the two groups a long sensory seta; subapically on medial side three small spines. Endite of maxilla I with two subapical and one apical penicil



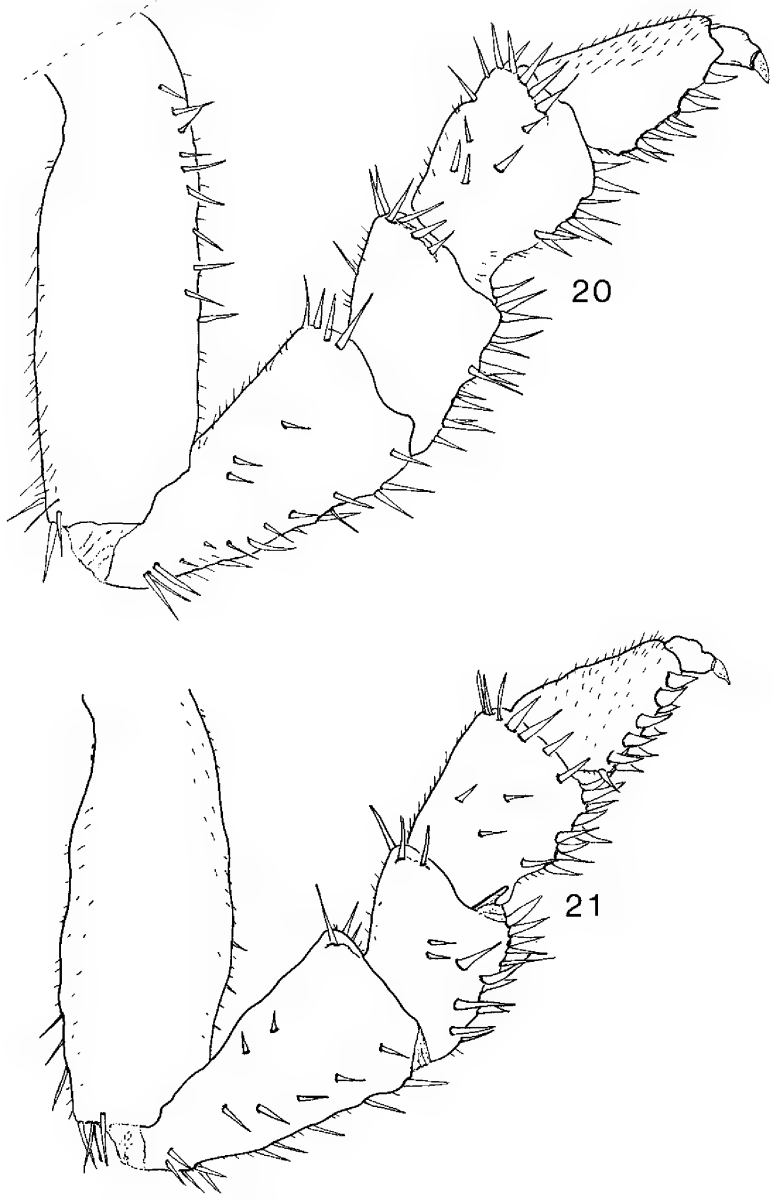
Figs. 15–17. *Tylos spinulosus,* ♂, neotype. – 15. Pereiopod I; – 16. pereiopod II; – 17. pereiopod III.

densely covered with hairy setae (fig. 10). Maxilla II and maxilliped see figs. 11–12. Pereiopod I in both sexes with latero-apical process on basipodite (figs. 13–14). All pereiopods with a rich armature of strong spines and short blunt and often cleft se-



Figs. 18–19. *Tylos spinulosus,* ♂, neotype. – 18. Pereiopod IV; –19. pereiopod V.

tae (figs. 15–29). Pereiopod VII with water-conducting scale-furrows (figs. 30–33). In ♀♀ pleopod-exopodite I is lacking as in all species of the genus, but in ♂♂ the exopodite I is present. All five pleopod-exopodites ventrally equipped with open lungs consisting of deep folds (see HOESE 1983: 490, fig. 2). Male endopodite II with long narrow apical part, apex not widened (fig. 34). Proximal third of endopodite II covered with hand-like scales with 3–5 "fingers" which are directed proximally (figs.

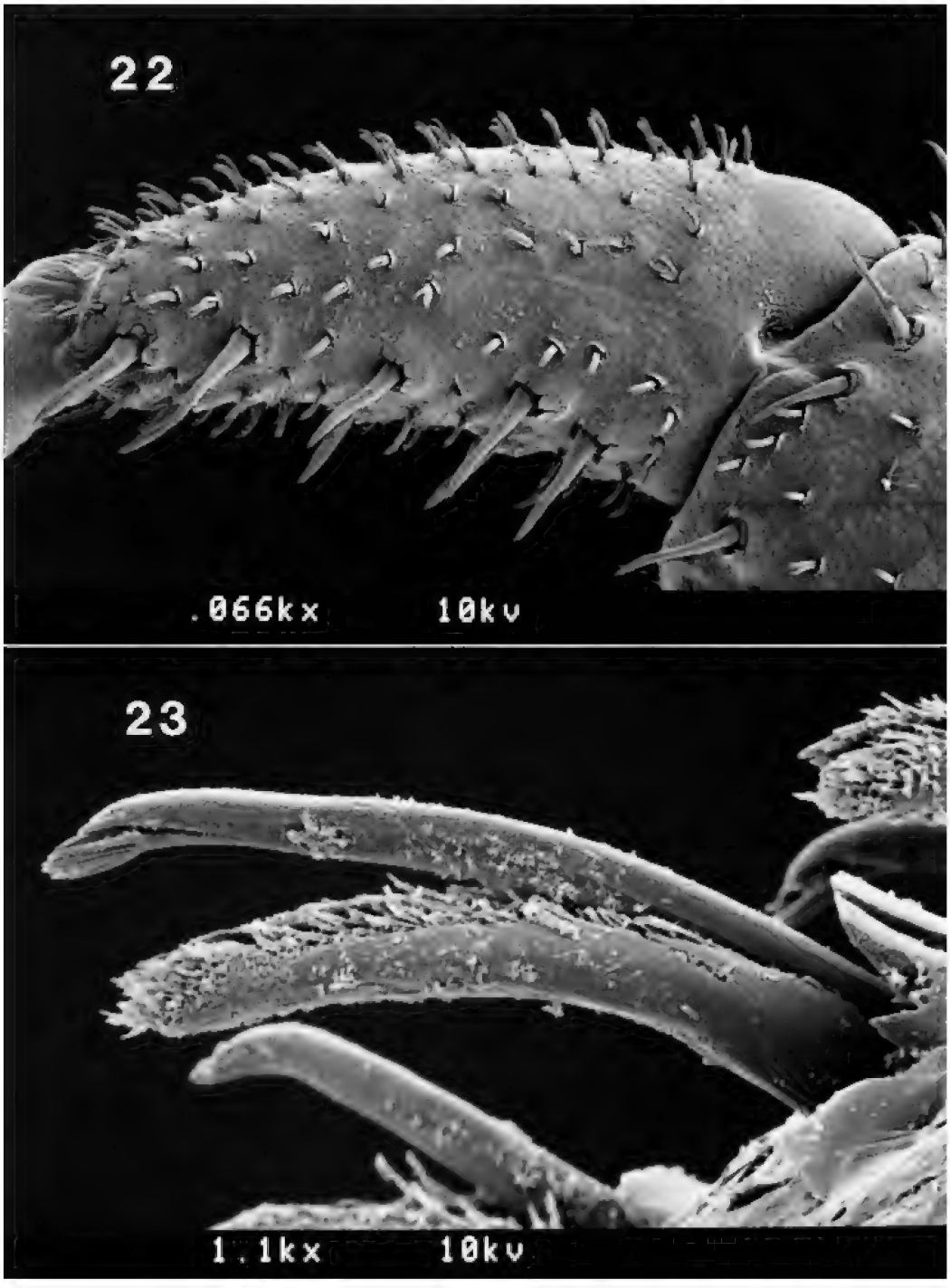


Figs. 20–21. *Tylos spinulosus,* ♂, neotype. – 20. Pereiopod VI; – 21. pereiopod VII.

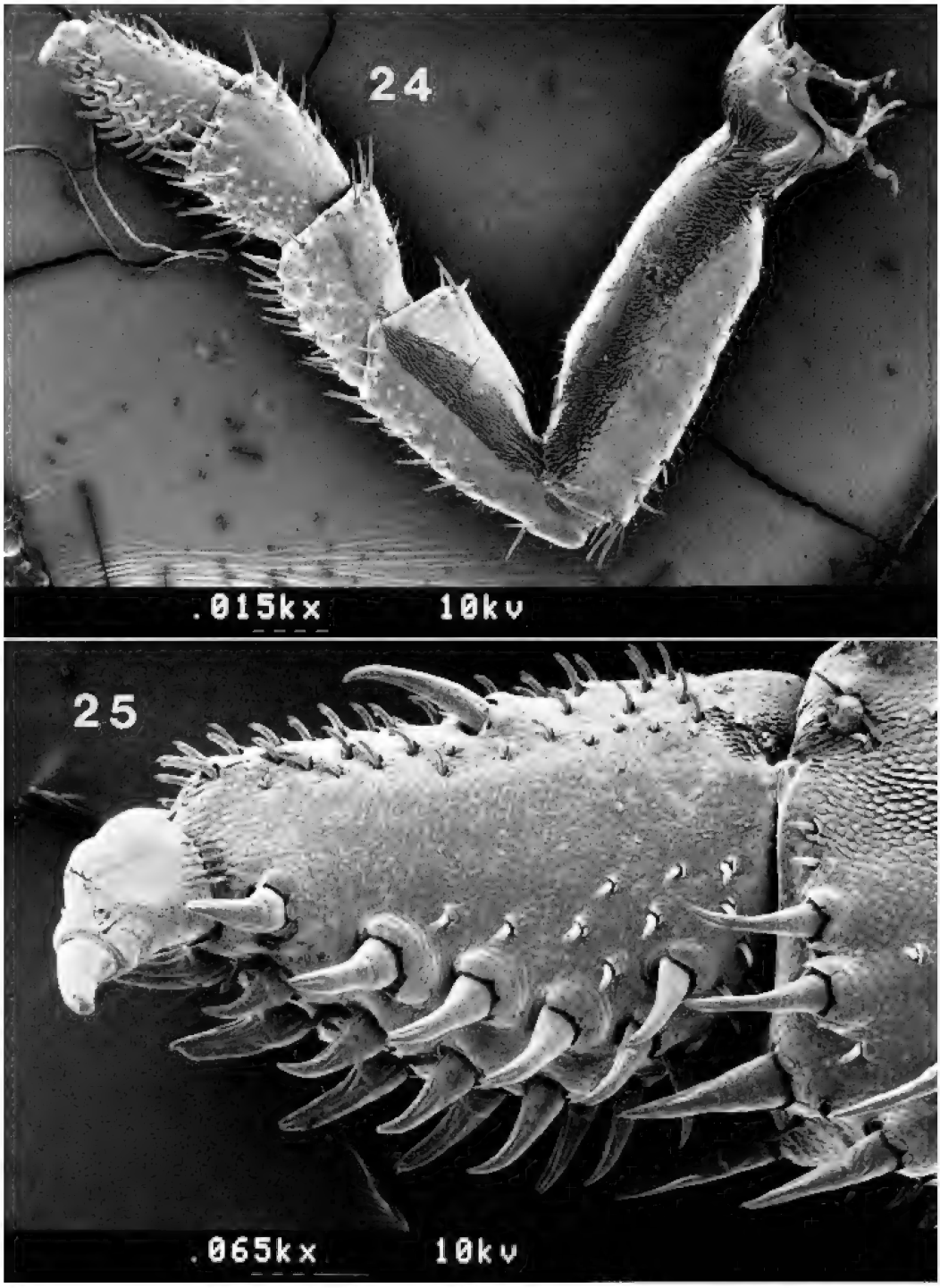
34, 36). Proximal half of endopodite II covered with scale-like rounded rows of very small setae whose tips are pointing distally (fig. 37). Uropods see figs. 5, 35.

Distribution

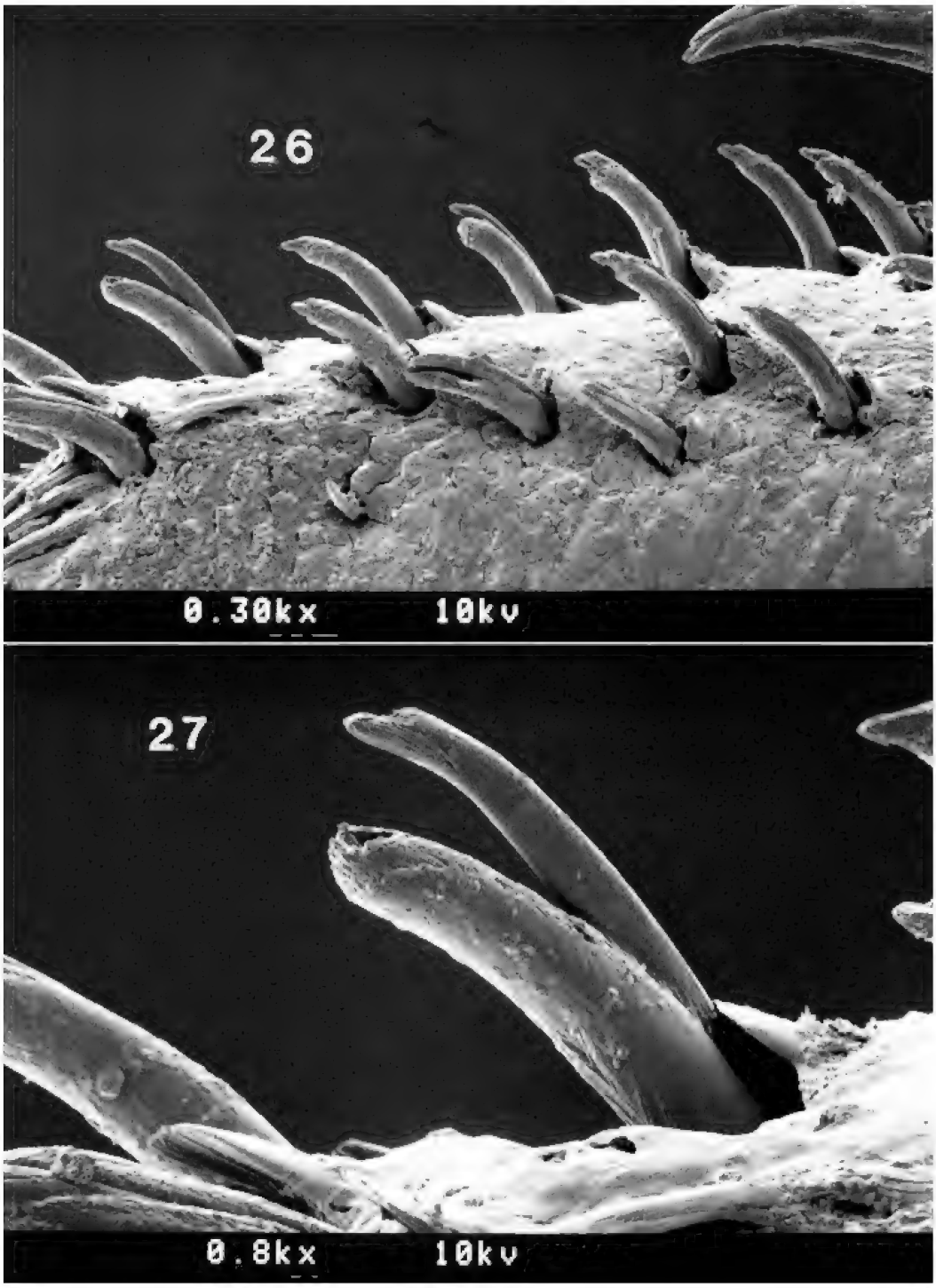
Pacific coast of Chile between Coquimbo (SW La Serena) and Copiapó (30° to 27° southern latitude, see map fig. 59). The locality "Toto, near Valparaiso" (Van Name 1936: 416, Schultz 1983: 680) could not be located and needs confirmation.



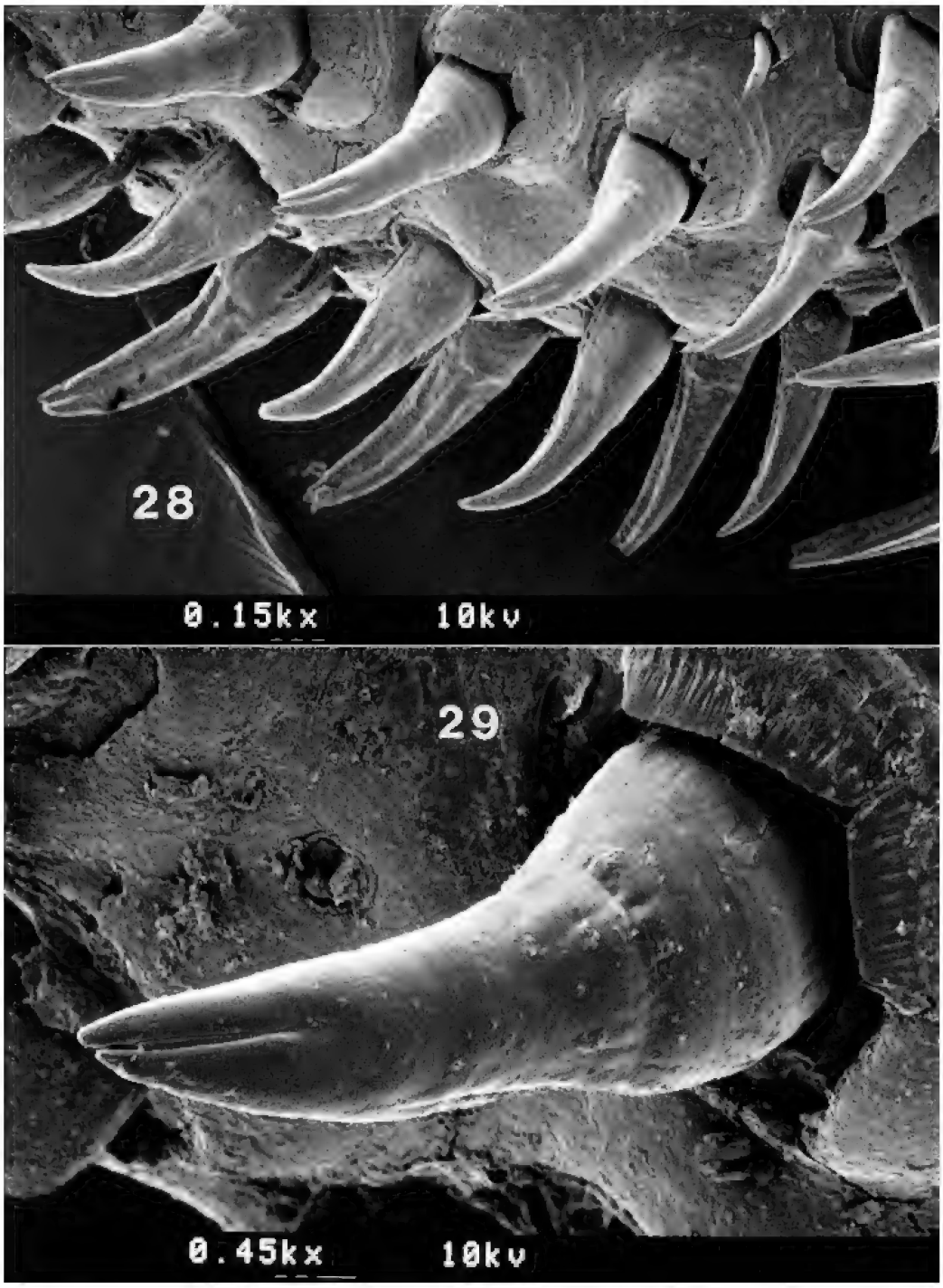
Figs. 22–23. *Tylos spinulosus,* ♂, 23 mm long, (SMNS 10023). – 22. Pereiopod I, propodus; – 23. pereiopod I, seta on distal part of propodus. – Scale for all of the SEM-photographs: The scale has to be multiplied with 1.2 (66 x 1.2 = 79 times enlarged).



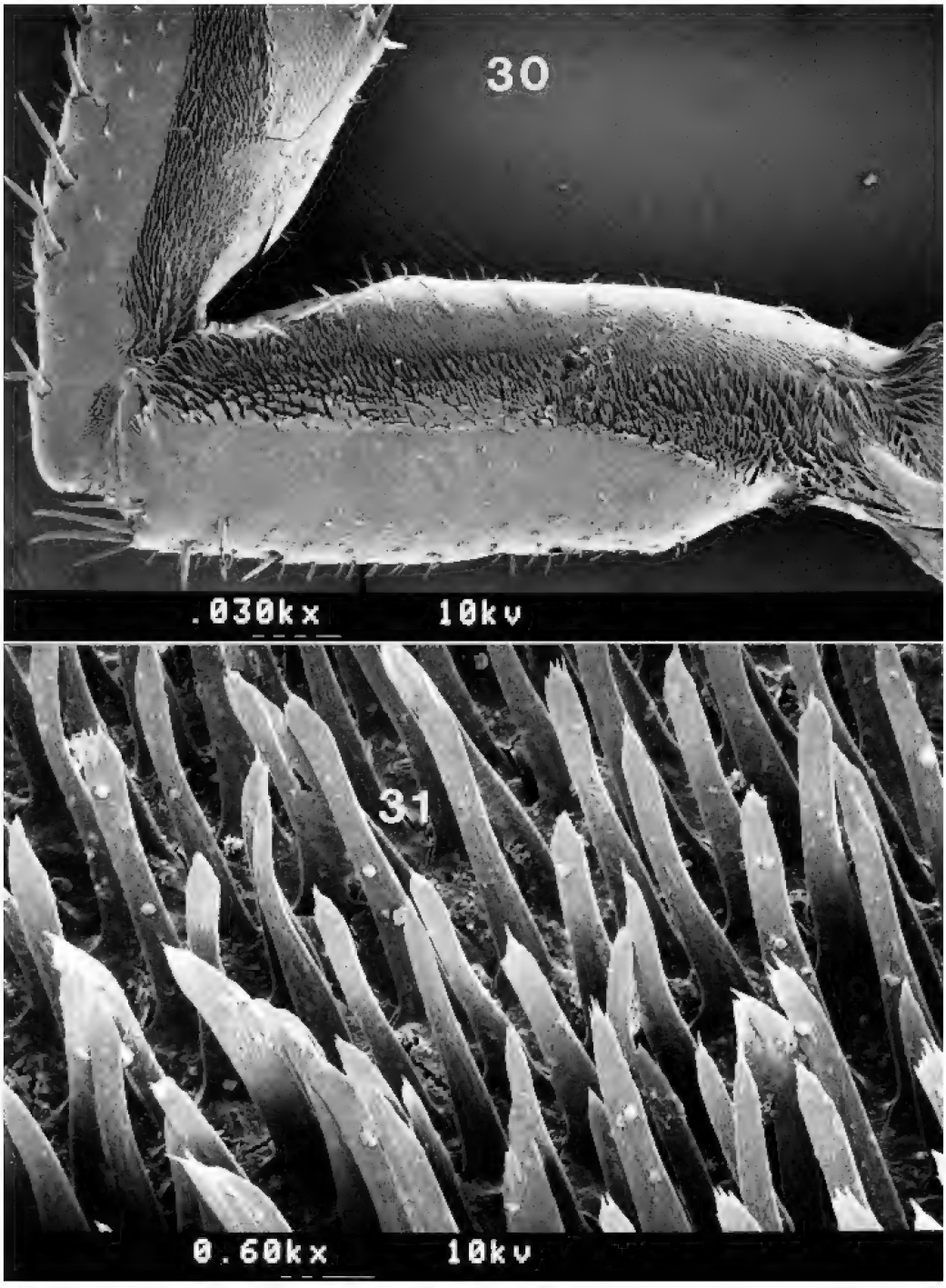
Figs. 24–25. *Tylos spinulosus,* ♂ as in fig. 22. – 24. Pereiopod VII; – 25. pereiopod VII, propodus and dactylus.



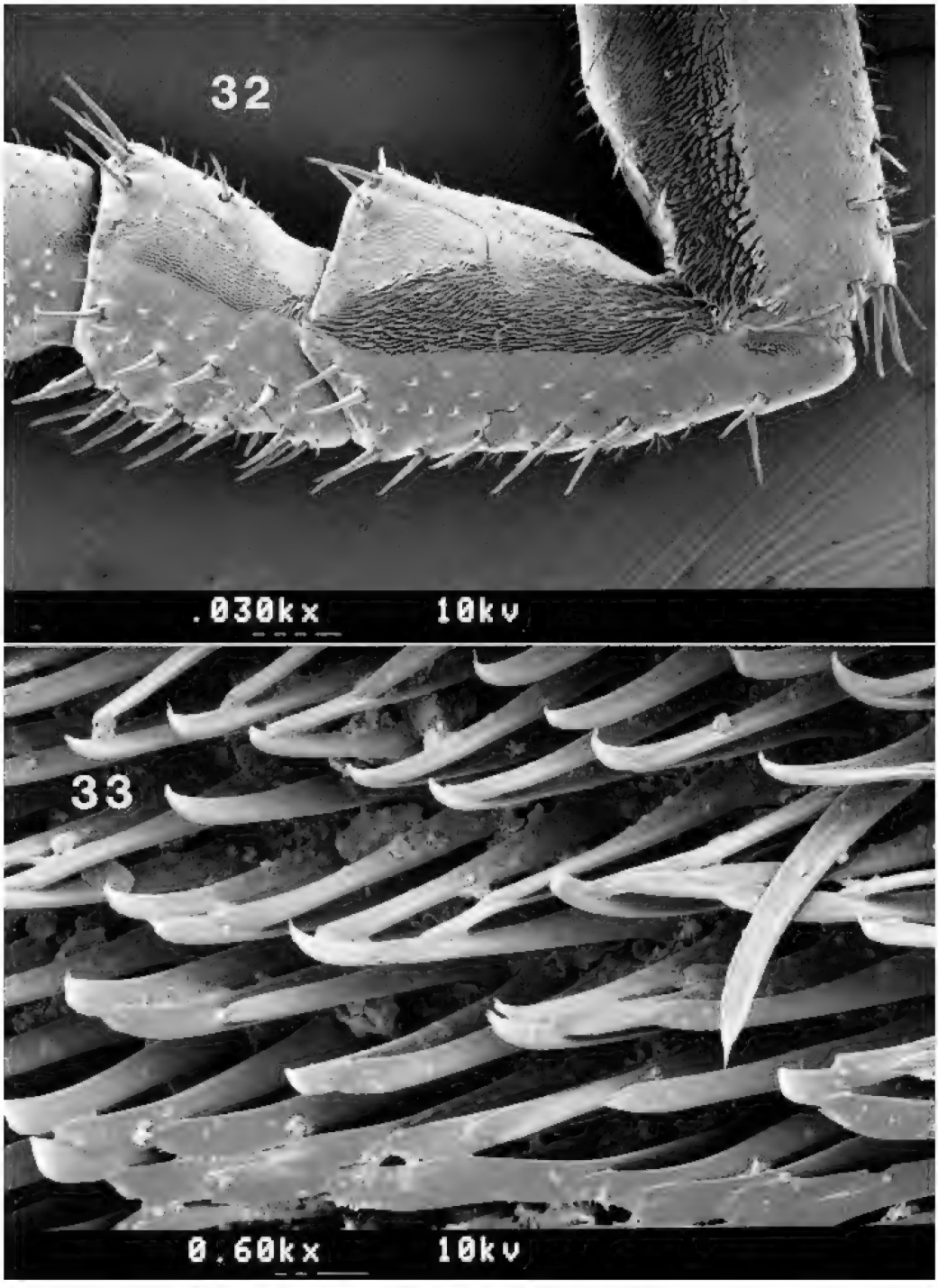
Figs. 26–27. *Tylos spinulosus,* ♂ as in fig. 22, pereiopod VII. – 26. Dorsal margin of distal part of propodus; – 27. as fig. 24, single seta.



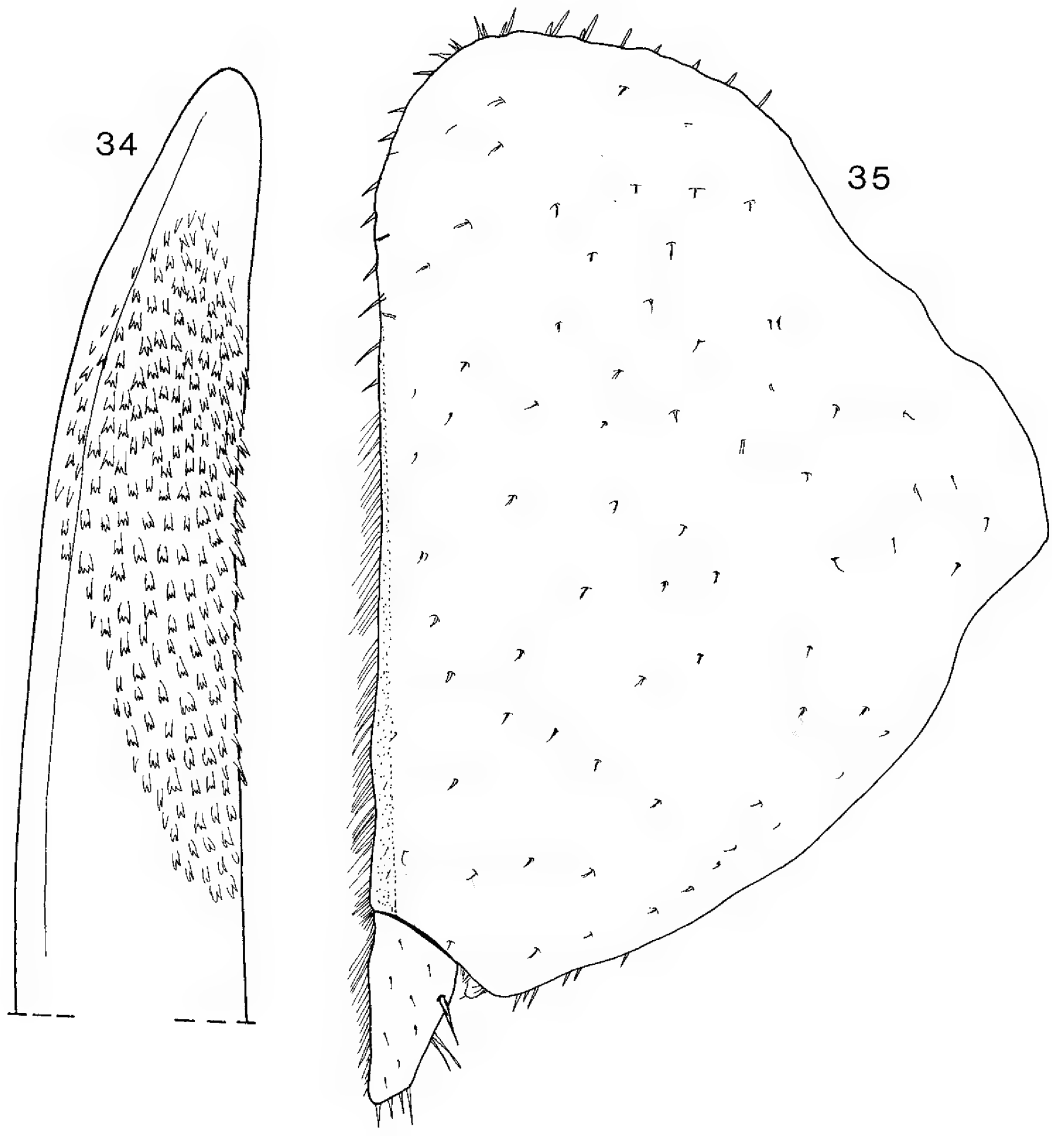
Figs. 28–29. *Tylos spinulosus,* ♂ as in fig. 22, pereiopod VII. – 28. Spines on ventral part of propodus; – 29. as fig. 28, single spine.



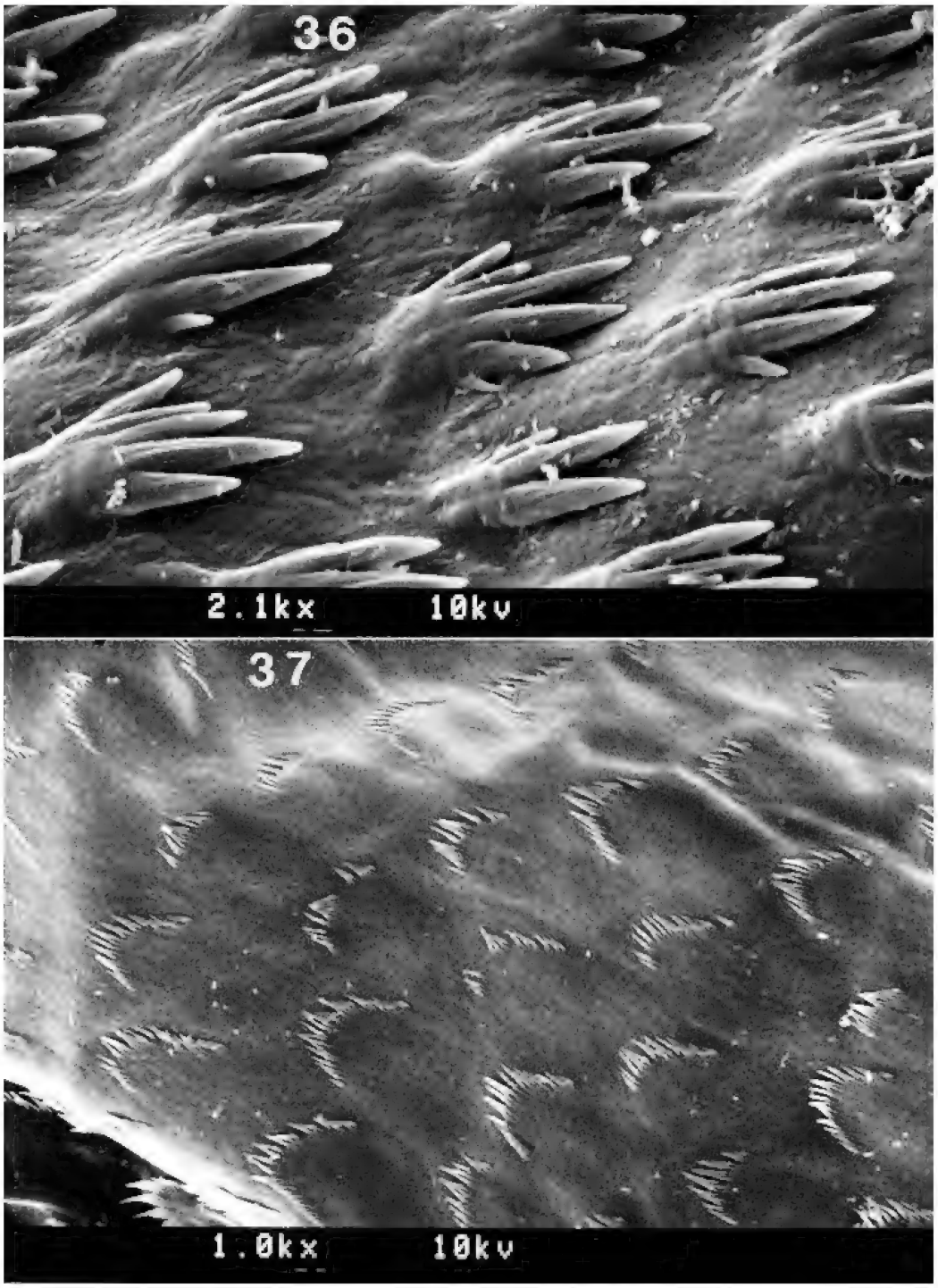
Figs. 30–31. *Tylos spinulosus,* ♂ as in fig. 22, pereiopod VII. – 30. Basipodite with scale-furrow (part of water-conducting system); – 31. detail of scale-furrow.



Figs. 32–33. *Tylos spinulosus,* ♂ as in fig. 22, pereiopod VII; – 32. Merus and ischium with water-conducting scale-furrows; – 33. detail of scale-furrow on ischium.



Figs. 34–35. *Tylos spinulosus.* – 34. ♂, 25 mm long (SMNS 10023, same sample as neotype), apex of pleopod-endopodite II, lateral view; – 35. ♂, neotype, left uropod, ventral view.



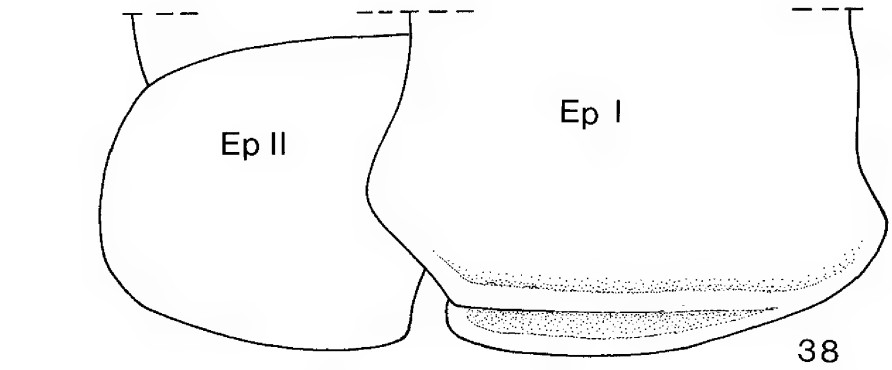
Figs. 36–37. *Tylos spinulosus,* ♂ as in fig. 34, pleopod-endopodite II. – 36. Detail of proximally directed hand-like scales on distal third of endopodite; – 37. detail of scale-like rounded rows of small setae directed distally on proximal half of endopodite.

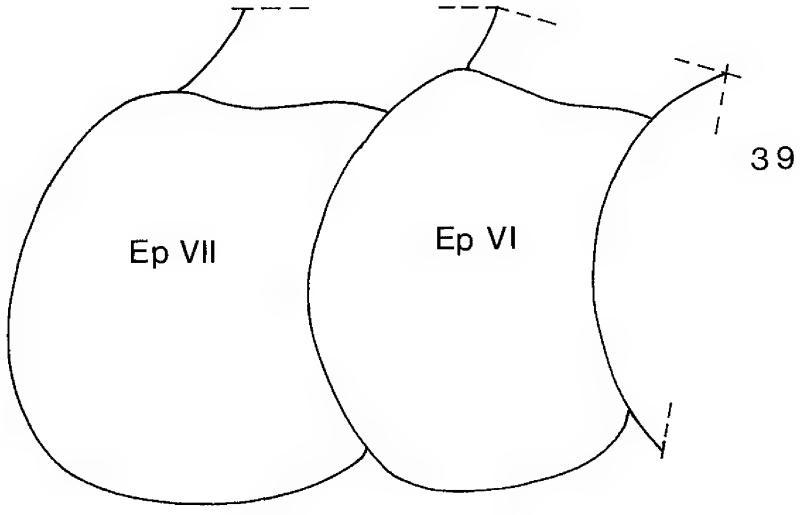
4.2. *Tylos chilensis* Schultz, 1983
(Figs. 38–58 and map fig. 59)

Bibliography see list on p. 4.

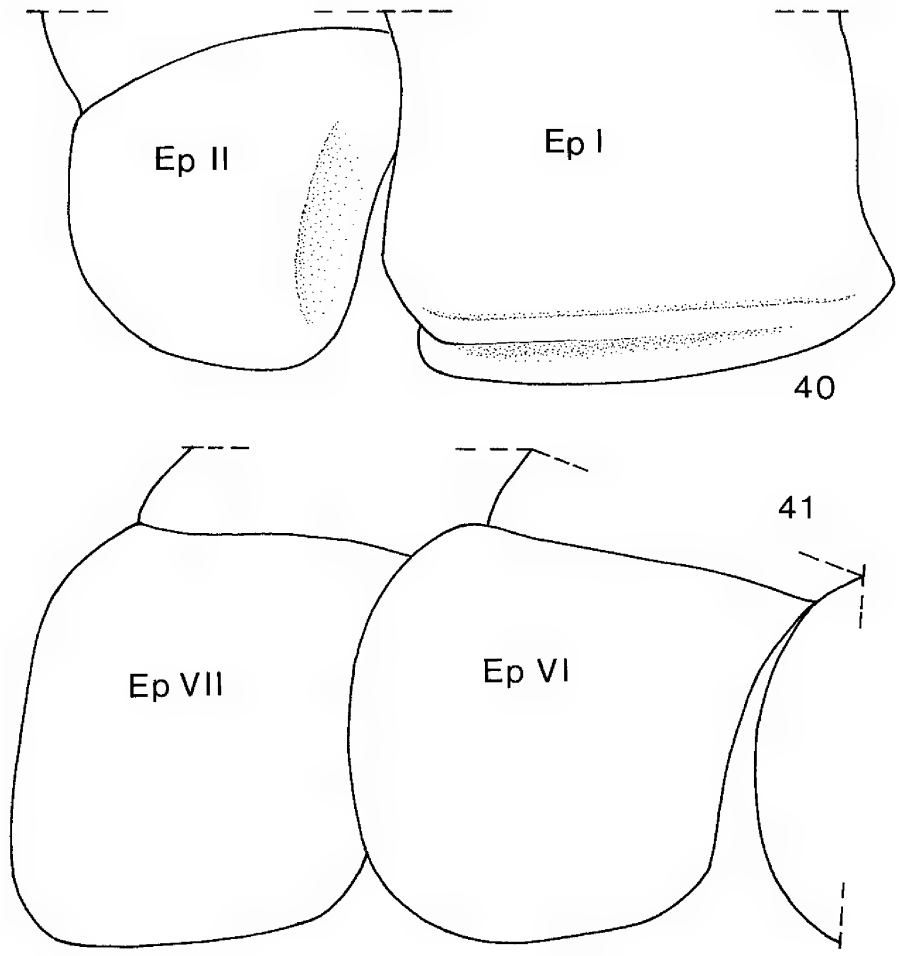
Material examined

Chile, Region de Atacama: 60 km NW Copiapó, Caldera, Quebrada el León, leg. ? 4. V. 1980, 6 specimens (SMNS 10151). – Region de Coquimbo: NW, Isla Choros, leg. Peña 7. VIII. 1980, 150 specimens (SMNS 10149); – NW, Isla Damas, leg. Peña 8. VIII. 1980, 19 specimens (SMNS 10150); – Los Vilos, Puta Tablas, leg. Peña 20. IV. 1980, 306 specimens (SMNS 10061); – SW, Pichidangui, leg. Peña 16. IV. 1980, 1 specimen (SMNS 10069); – "Guanaqueros" (not located), leg. Peña 12. IV. 1980, 18 specimens (SMNS 10063). – Region de Valparaiso: 50 km N Valparaiso, Cachagua, leg. Vergara 5. II. 1989 (SMNS 10146).





Figs. 38–39. *Tylos chilensis*, ♂, 12 mm long (SMNS 10063, Coquimbo). – 38. Pereion-epimera I and II, lateral view; – 39. pereion-epimera VI and VII, lateral view.



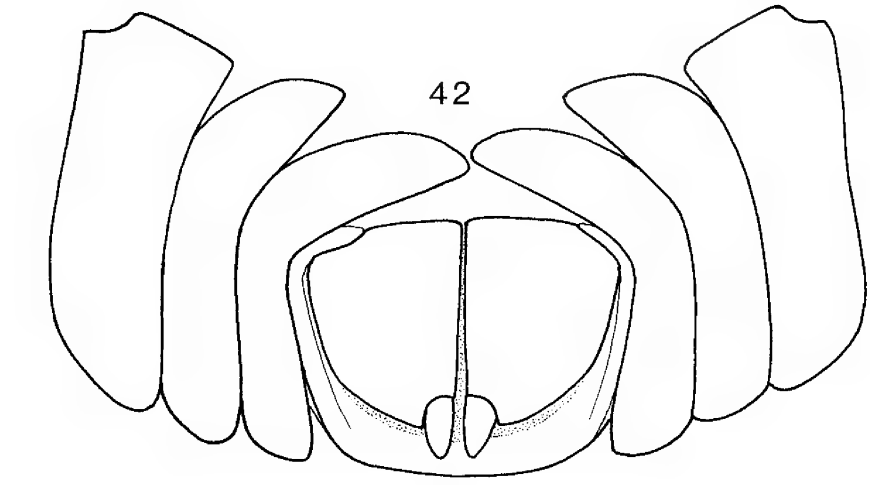
Figs. 40–41. *Tylos chilensis,* ♂, 10 mm long (SMNS 10151, Caldera NW Copiapó), as figs. 38–39.

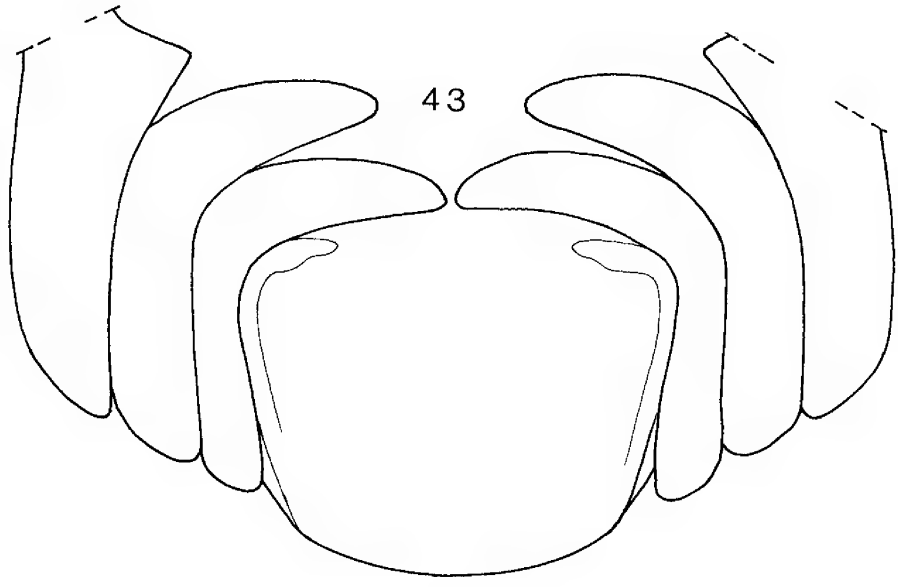
Description

Coloration: Yellowish, dorsally with many small dark pigment dots.

Maximum dimensions: Length 12 mm, width 6 mm.

Cuticle covered with short upright setae which may be partly or completely cleft, as in *T. spinulosus.* Head as in *T. spinulosus.* Pereion-epimera I with schisma and lateral groove, hind corner obliquely truncated, more so in bigger specimens (figs. 38 and 40, intermediate forms found in other specimens). Epimera VI and VII see figs. 39, 41. Ventral phylacomera present on pleon-epimera IV and V, the latter sickle-shaped with a more or less pronounced angle on the medial side and with the tips reaching the median line (figs. 42–43). Antenna I as in *T. spinulosus.* Antenna II with a three-jointed flagellum, proximal joint 1.5 times the lenght of the second one, apical joint one third the length of the second one (figs. 44–45). Cleft setae on antenna II and pereiopod I see figs. 46–47. Pereiopod I with latero-apical process on basipodite (figs. 48, 50–51, 56), propodus and dactylus see figs. 52–53, 57. Pereiopod II see fig. 49. Pereiopod VII with scale-furrow on basipodite, and with scale-ribbons



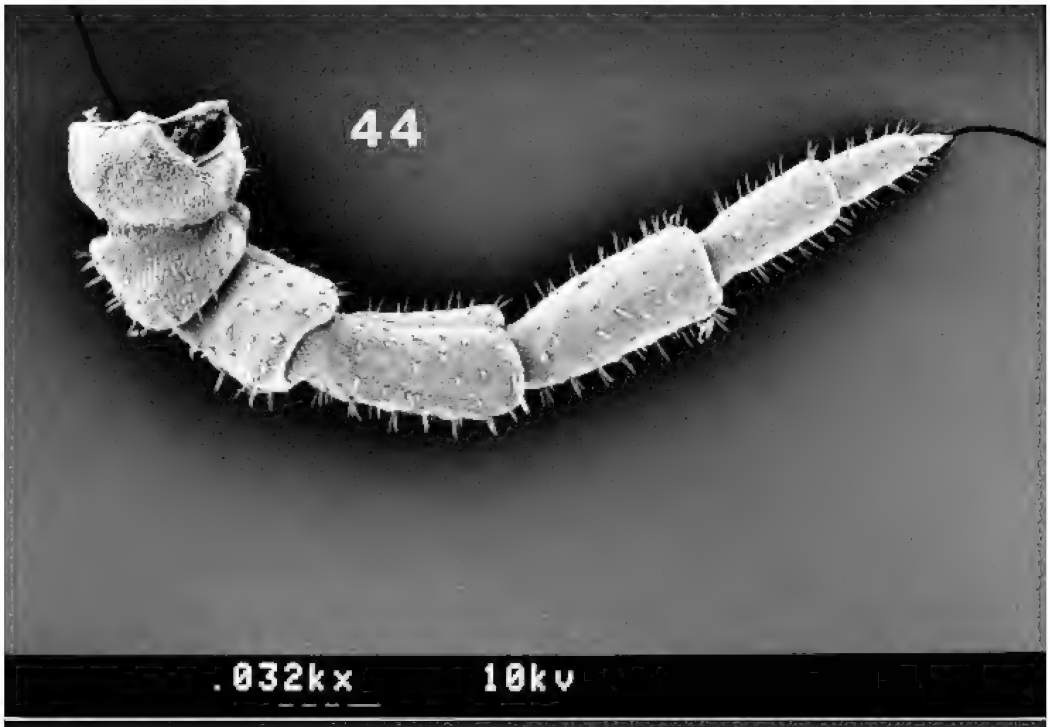


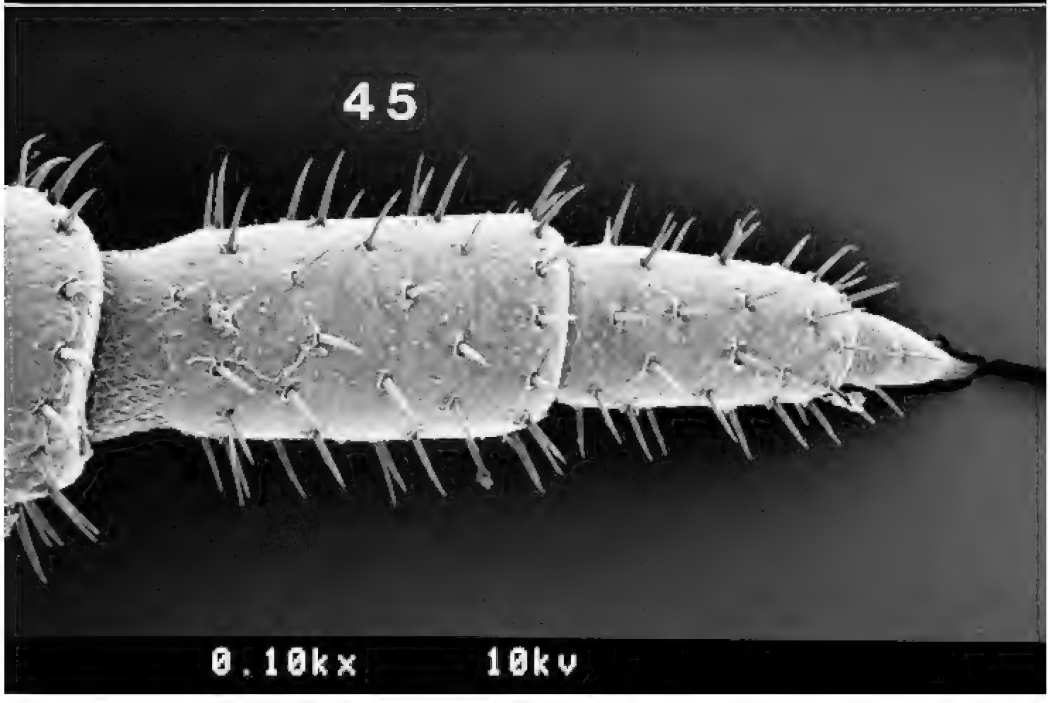
Figs. 42–43. *Tylos chilensis.* – 42. ♂, 12 mm long (SMNS 10063, Coquimbo), ventral view of exterior parts of pleon with phylacomera, uropods and telson; – 43. ♂, 10 mm long (SMNS 10151, Caldera), as before, without uropods.

on ischium and merus (figs. 54–55). As in *T. spinulosus* pleopod-exopodite I in males present, all five and in females all four exopodites equipped ventrally with sponge-like deeply folded open lungs as in *T. spinulosus.* Pleopod-endopodite II with truncated apex, which is not enlarged, apical fourth armed with hooks which point in a proximal direction and which are partly hand-shaped with several "fingers" as in *T. spinulosus* (fig. 58). Uropods see fig. 42.

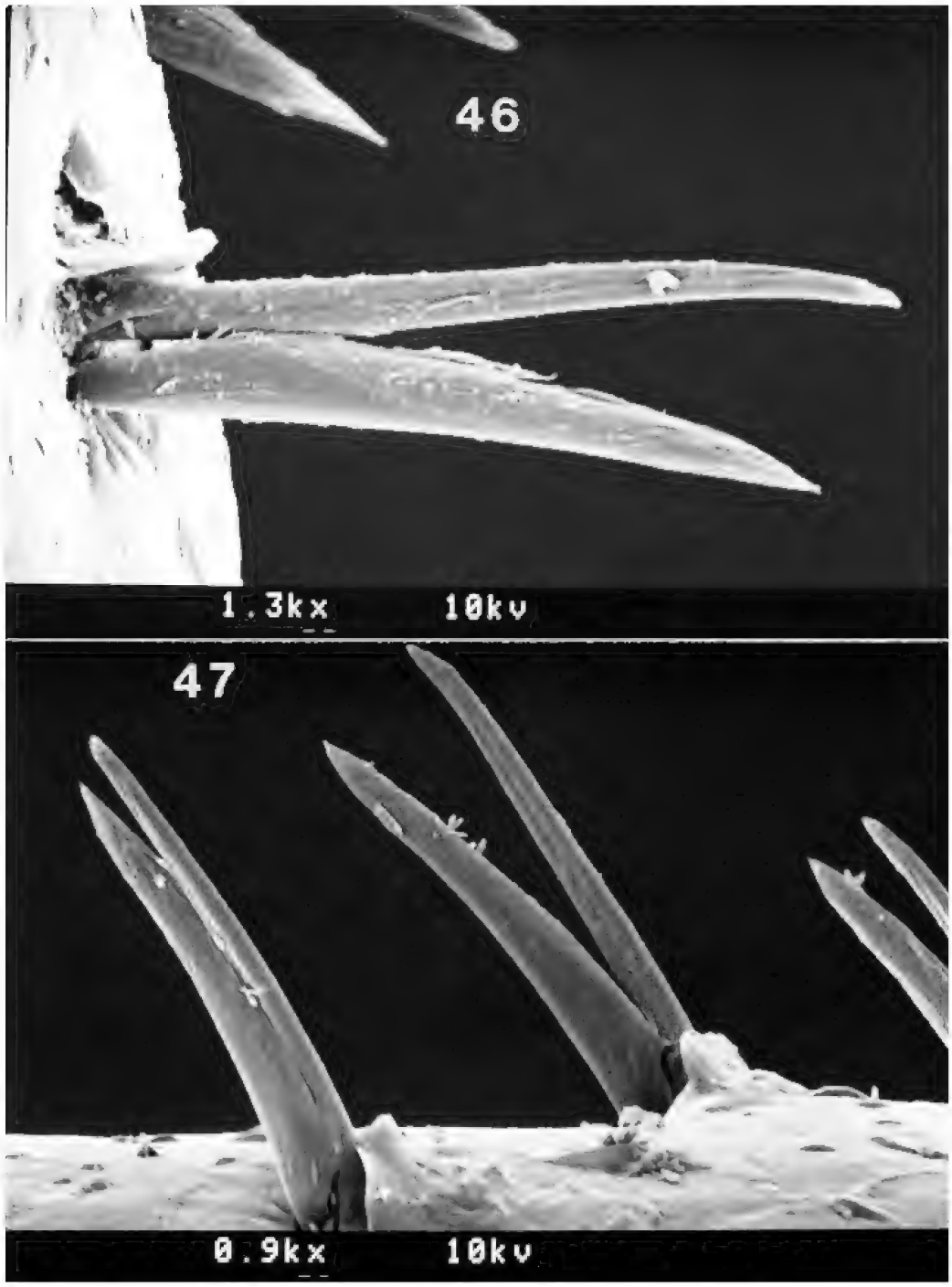
Distribution

Pacific coast of Chile from Valparaiso to Caldera 60 km NW Copiapó (33° to 27° southern latitude, see map. fig. 59).

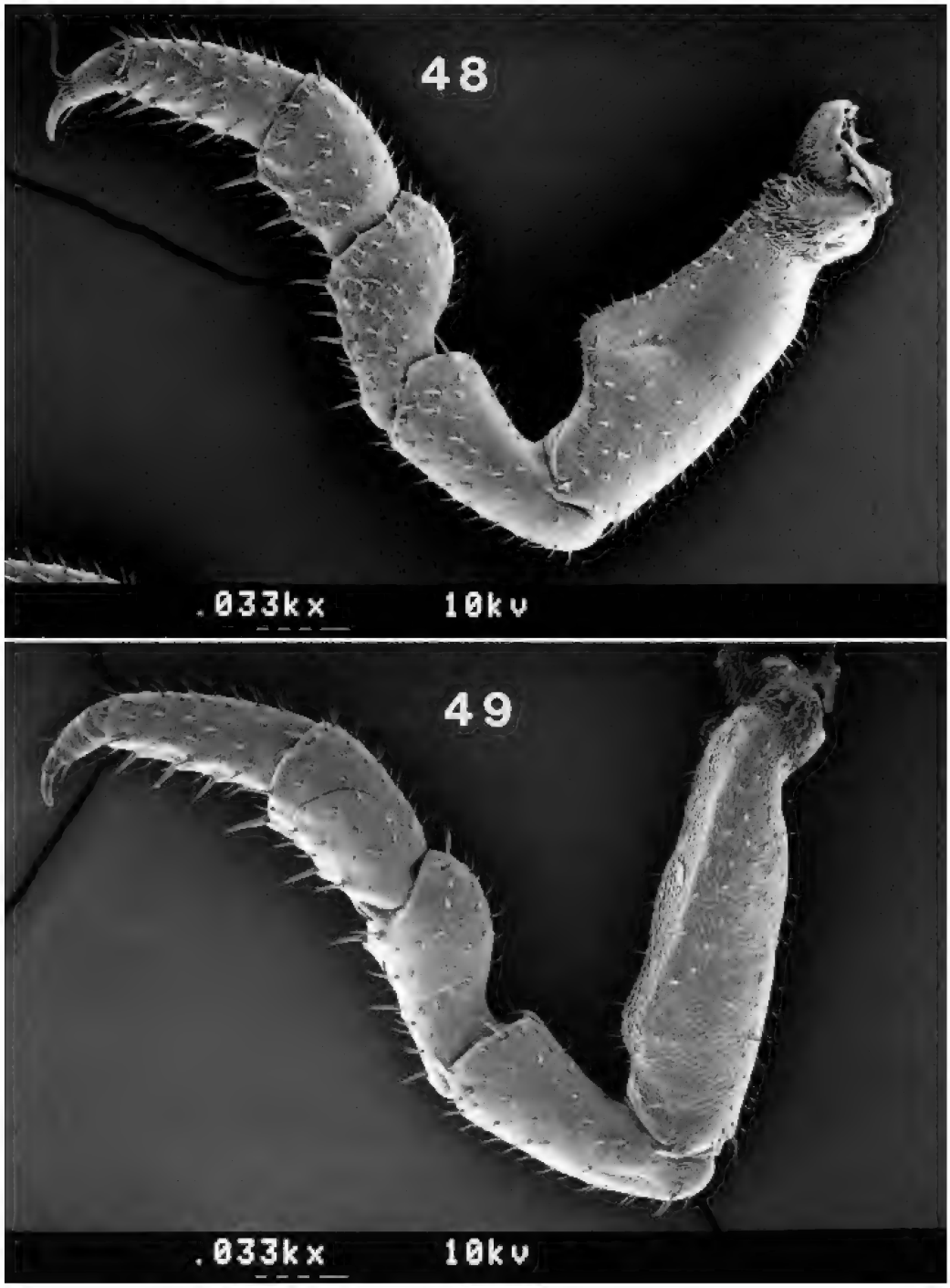




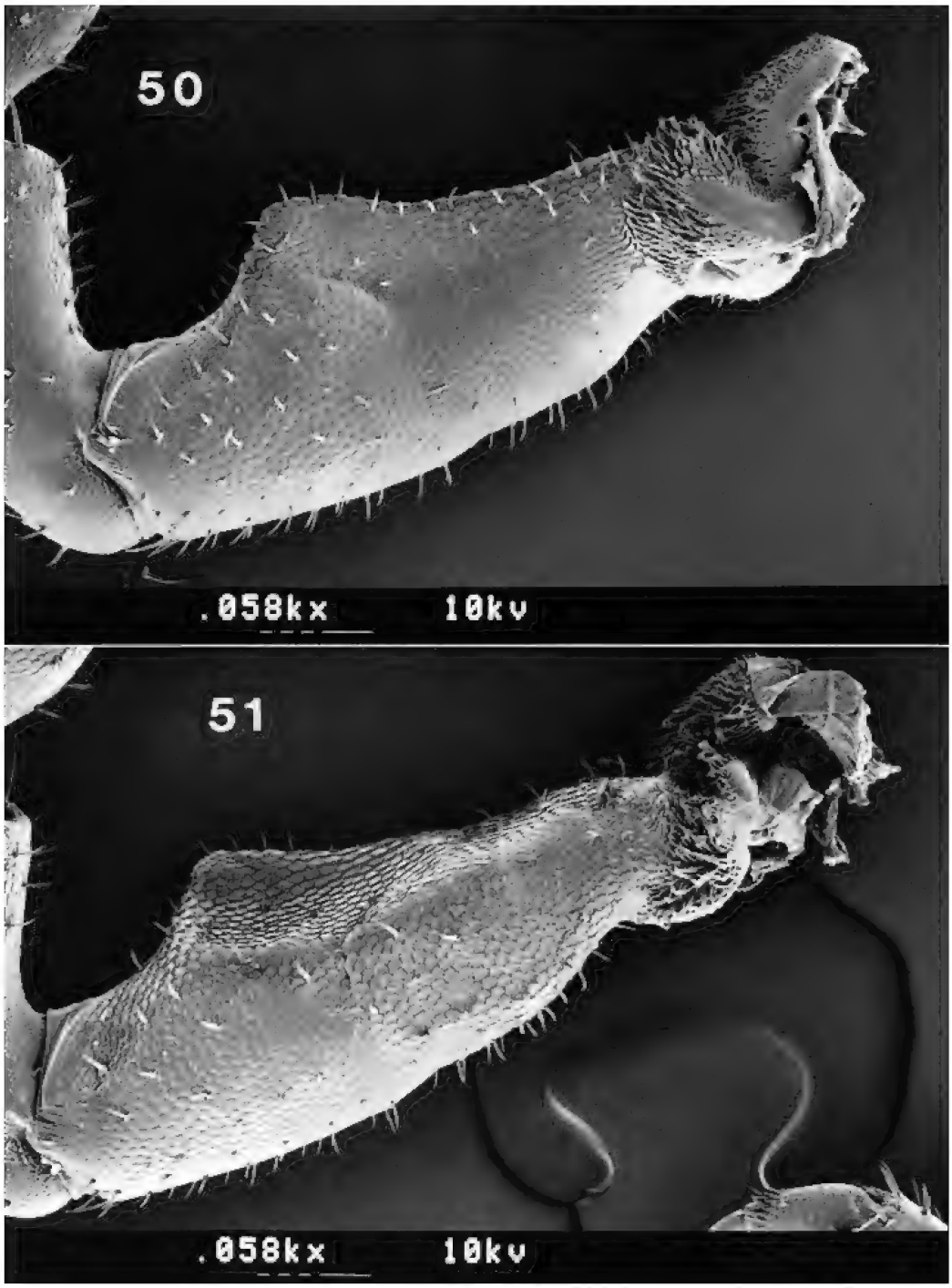
Figs. 44–45. *Tylos chilensis*, ♂, 12 mm long (SMNS 10063, Coquimbo). – 44. Antenna II; – 45. flagellum of antenna II.



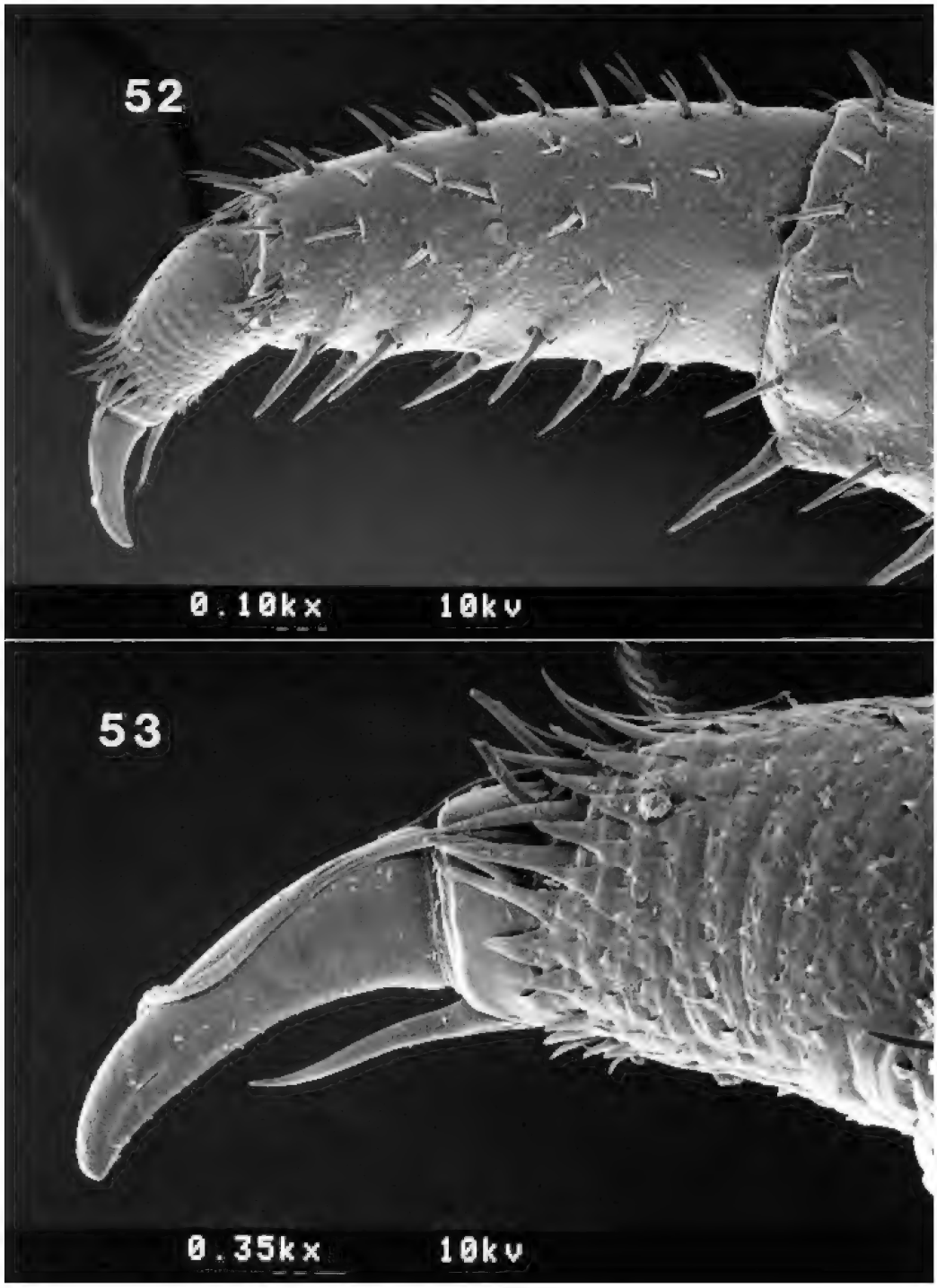
Figs. 46–47. *Tylos chilensis*, ♂ as in fig. 44. – 46. Cleft seta on distal joint of antennal peduncle; – 47. cleft setae on propodus of pereiopod I.



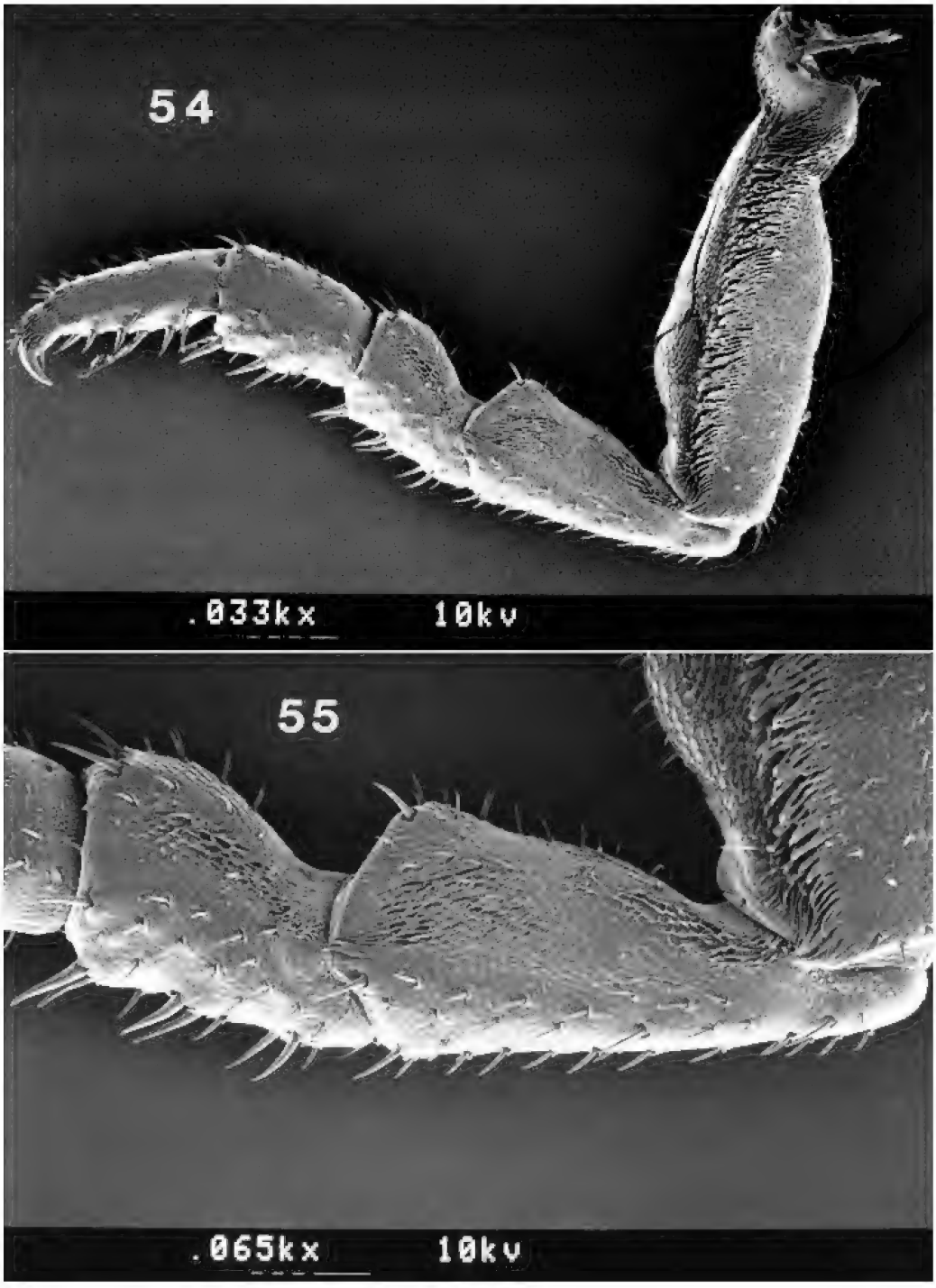
Figs. 48–49. *Tylos chilensis,* ♂ as in fig. 44. – 48. Pereiopod I; – 49. pereiopod II.



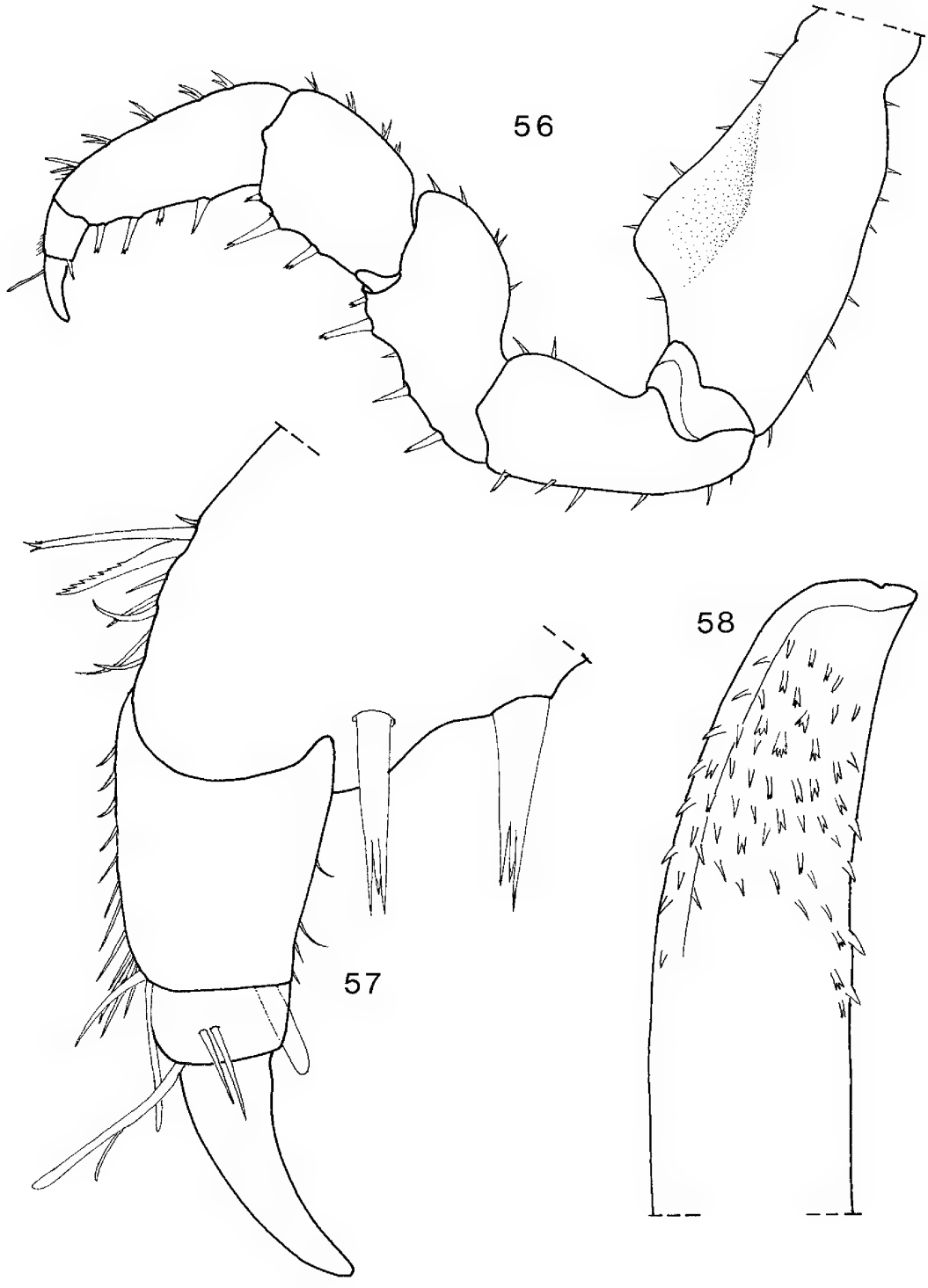
Figs. 50–51. *Tylos chilensis*, ♂as in fig. 44, pereiopod I, basipodite. – 50. Frontal view; – 51. caudal view.



Figs. 52–53. *Tylos chilensis,* ♂ as in fig. 44, pereiopod I. – 52. Propodus; – 53. apex of dactylus.



Figs. 54–55. *Tylos chilensis*, ♂ as in fig. 44. – 54. Pereiopod VII; – 55. merus and ischium of pereiopod VII with water-conducting scale-ribbons.



Figs. 56–58. *Tylos chilensis,* ♂, 11 mm long (SMNS 10151, Caldera NW Copiapó). – 56. Pereiopod I, caudal view, setae and spines shown only in the outline; – 57. pereiopod I, apex of propodus and dactylus; – 58. pleopod-endopodite II, apex, lateral view.

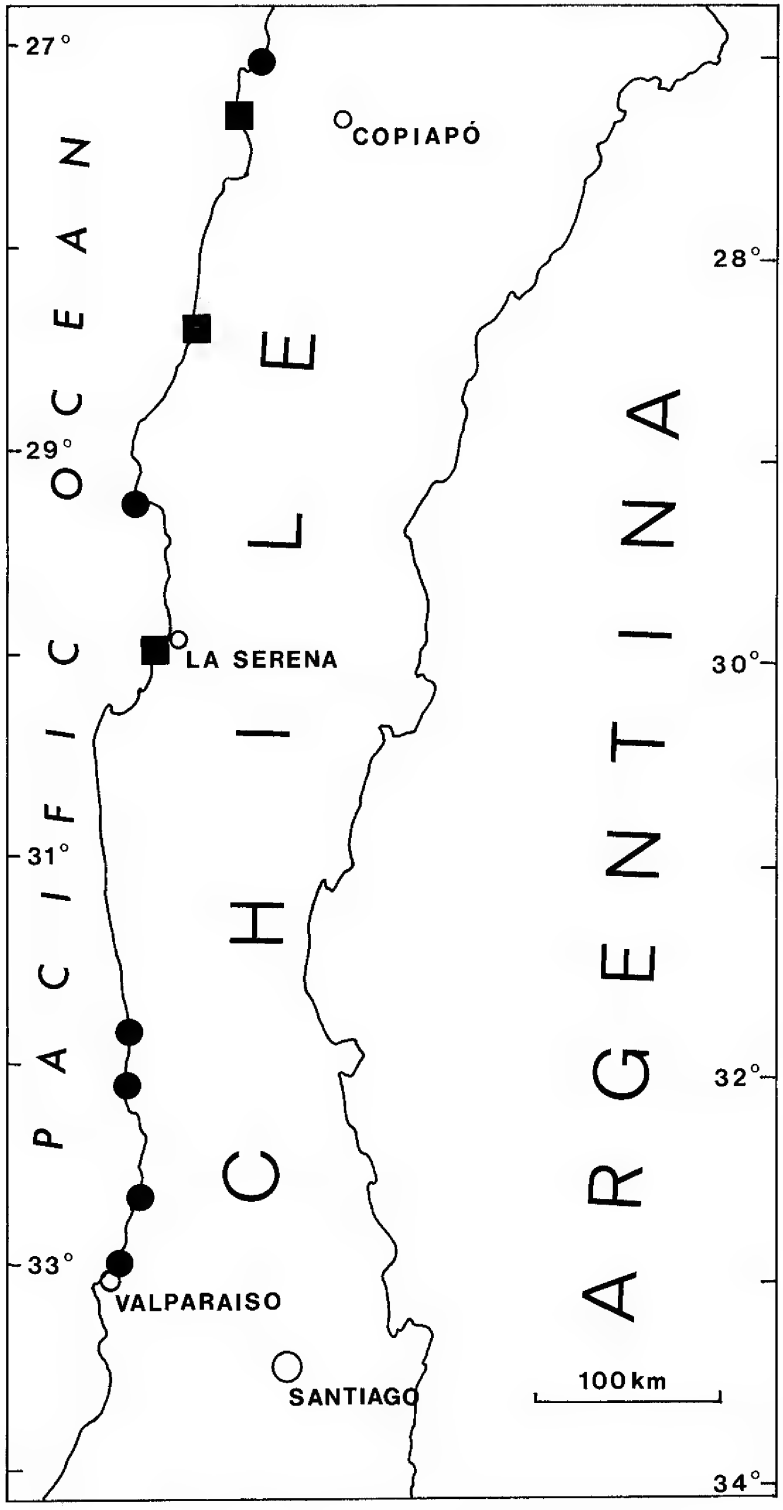


Fig. 59. Map of central Chile with safe records of *Tylos spinulosus* (■) and *T. chilensis* (●).

5. Abbreviations and acknowledgments

SMNS = Staatliches Museum für Naturkunde Stuttgart, with number of isopod collection.

Dr. K. Wolf-Schwenninger (SMNS) operated the scanning electron microscope and produced the photographs. We thank Drs. F. Ferrara and S. Taiti (Firenze/Italy) for helpful comments on earlier drafts of this paper, and for the permission to cite from an unpublished manuscript.

6. References

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ISSN 0341-0145

Schriftleitung: Dr. Wolfgang Seeger, Rosenstein 1, D-70191 Stuttgart
Gesamtherstellung: Gulde-Druck GmbH, D-72072 Tübingen